Vol. XXXII. Part 8.

RECUSEP 17 1921
P
AGRIC
A

THE AGRICULTURAL GAZETTE OF NEW SOUTH WALES

STORAGE

AUGUST 1921

Registered at the General Post Office, Sydney, for transmission by Post as a Newspaper.

Price SIXPENCE.

AN OWNER WRITES:—

HERE is the experience of an ESSEX owner who uses two of these cars for Service work, carrying overloads of passengers and luggage on country roads of rough surface and severe gradients.

"In regard to my two ESSEX Cars I cannot say anything against them - they are the best cars I have had, both in petrol consumption and tyre upkeep. The big car has been tested a good many times with seven and eight on to Walcha and back, and every time has done 25 miles to the gallon. The small car did a long trip the other day to Tyringham, on the rivers, and back; road bad, and hardly fit for a motor to travel in places; drove it myself, and I averaged 22½ miles to the gallon."

"TYRES! I very seldom take one off under 7,000 miles, and have had some to go over 10,000 miles. One of my original tyres I have in my shed did 13,000 miles; that is a fact. My old car has done now 22,300 miles. I can prove to you any of these words that I have said."

J. MONCKTON, Armidale."

DALGETY & COMPANY LIMITED
136 PHILLIP ST. SYDNEY.

Get the most out of your Cows
A STUDY of the feed given to great producing cows shows that Protein—rich feed must be given in plenty. Even the best cows cannot give satisfactory yields unless they receive adequate rations. It pays to feed—
Sunlight Oil Cake
to the whole herd, especially in winter time.
MANUFACTURED BY
LEVER BROTHERS
LIMITED
SYDNEY
from All STORE KEEPERS

To Graziers and Settlers.

KINDLY NOTE—

If you are changing your Wool Broker—

Please think of

SCHUTE, BELL & Co., Ltd.

They give PERSONAL ATTENTION to YOUR INTERESTS, and are a New South Wales Company.

OFFICES—

44 BRIDGE STREET, SYDNEY.

THE COMMERCIAL BANKING COMPANY OF SYDNEY

Established 1834. LIMITED.

CAPITAL PAID-UP	£2,500,000 0 0
RESERVE FUND	2,220,000 0 0
RESERVE CAPITAL	2,500 000 0 0
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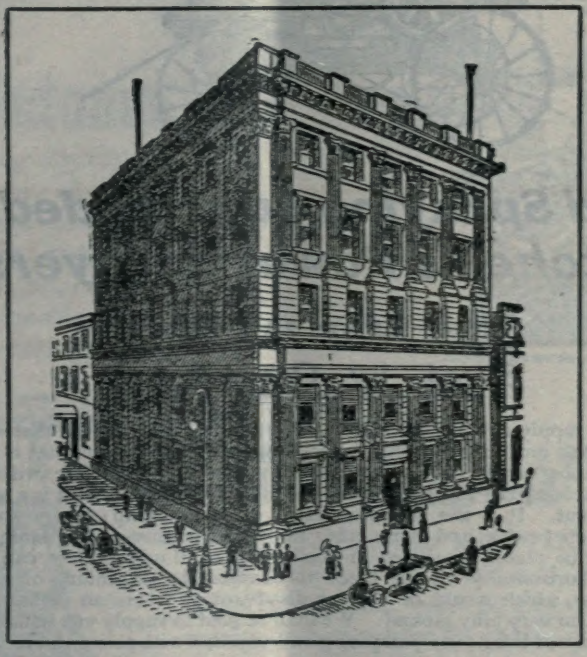

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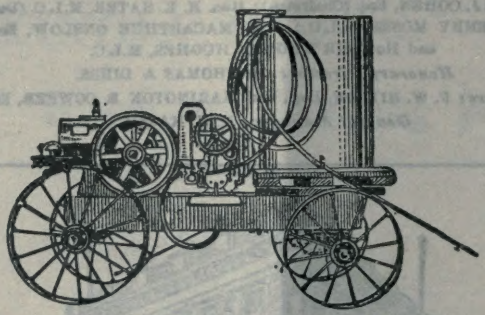
Mitchell's complete Power Spray Plants



Hand Spraying Superseded by Mitchell's Power Sprayers.

Time, Labor and Money Saved by Orchardists !

We can supply Orchardists with a complete Spraying Outfit that will eliminate a great deal of time, worry and labor—a machine that is far in advance of the old hand-spraying methods. Complete with a dependable 2½ H.P. Engine, truck and all fittings, this outfit is a safe investment. It is the very best make of spray pump; has pressure gauge, relief valve, and many other important features. The tank, or vat, can be placed as shown in illustration or, if user prefers, can be placed horizontally on the truck to obviate the possibility of top-heaviness, which would be a great disadvantage where an orchard is situated on very hilly ground. We shall be glad to supply you with full particulars of this power-pumping plant, together with prices and terms.

An additional advantage is that your Spraying Outfit Engine can be adapted for your saw-bench, separators and other tasks where power is required.

MITCHELL & CO. PTY. LTD.

Australian Manufacturers for over 25 years.

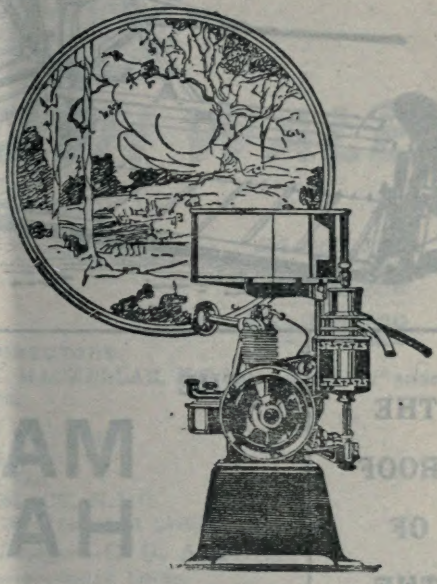
PARRAMATTA ROAD, BURWOOD,

Corner BURWOOD ROAD.

SYDNEY.

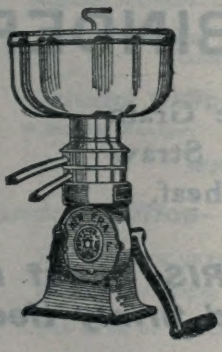
Skimming the Milk
Without Skimping the Profits.

The only separator really worth using is the one that saves ALL the cream. Any other is a sure and steady drainer of profits. Buzacott's recommend :—



The "Automatic"

A separator and a driving power all in one unit. It is a sure saver of every tiniest particle of cream —a guarantee that you are making the most of the milk-yield. And



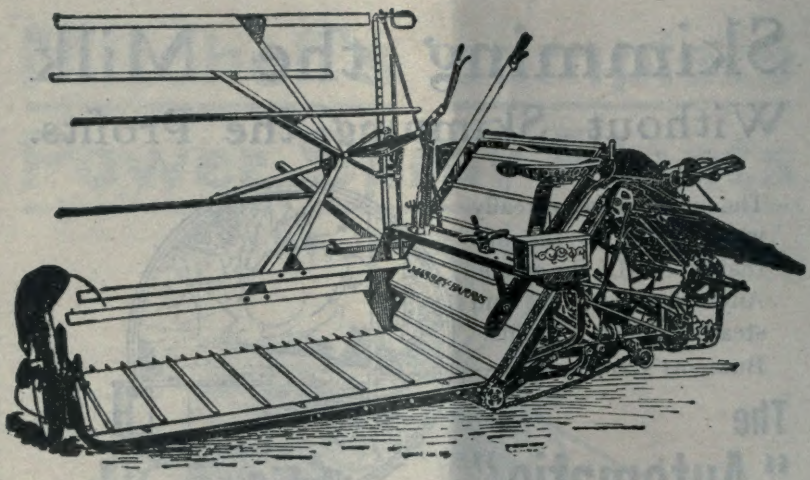
The "New Era"

A hand separator that skims closely, runs easily, and is so strong and simple that it works year after year without needing repairs or diminishing its efficiency.

Write and ask for complete details.

Buzacott & Co. LIMITED

7-11 Market Street :: :: SYDNEY.



THE PROOF OF THE BINDER IS IN THE SHEAF.

THE

MASSEY-HARRIS

REAPER & BINDER

puts ALL the Grain
and ALL the Straw
into the Sheaf.

The MASSEY-HARRIS Sheaf is neat, compact and firmly tied.

Sample Machines may be inspected
at any of the leading Agencies of—

MASSEY-HARRIS CO., LTD.,
35 Broadway — SYDNEY.

BANK OF

NEW SOUTH WALES

ESTABLISHED 1817.

Paid-up Capital	£4,965,200
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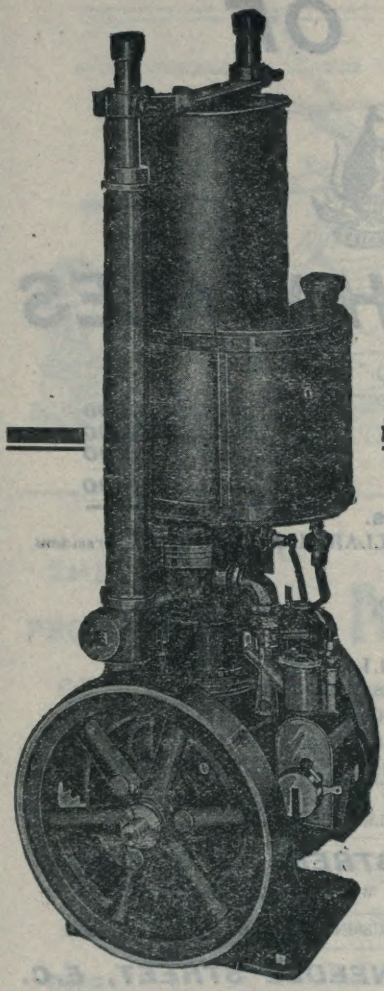


FOR AN ALL-ROUND UTILITY ENGINE

The

Cooper

"Little Wonder"

IS UNEXCELLED.

It has been designed and built for farm work, developes full 2 b.h.p., and is known throughout Australia for its strong, practical construction, and long life.

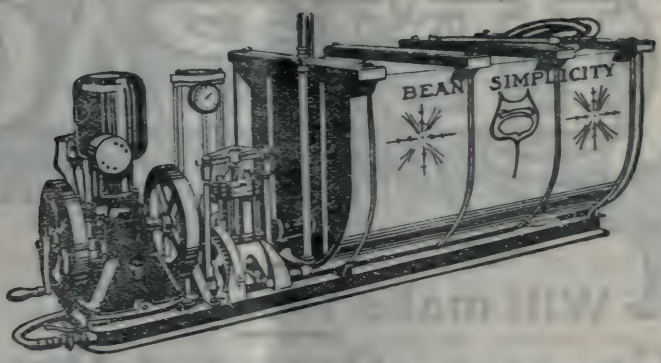
On over 1000 Australian farms and stations this engine is giving the efficient satisfactory service that has won for it an enviable reputation the world over.

SPECIAL WOOD-SAWING, CHAFF-CUTTING, PUMPING, and SHEARING OUTFITS have been constructed for use with the "LITTLE WONDER" Engine.

Write for illustrated leaflet, giving full particulars of both engine and outfits.

COOPER ENGINEERING CO. LTD.

126 Sussex Street, Sydney. 486 Collins Street, Melbourne.



PROFITABLE ORCHARDING

depends to a great extent on the healthiness of the trees. Yet to spray them all thoroughly by hand is often too big a task for the orchardist.

THE BEAN SIMPLICITY POWER OUTFIT 605

overcomes this difficulty. As its name implies, it is the simplest power sprayer ever built.

It is equipped with the famous Novo Engine, 150 gallon tank mounted on a steel frame, rotary agitator, and Bean Pressure Regulator

Specification of Pump : 2¾in. cylinder, porcelain lined, 4⅛in. stroke, 50 R.P.M., 4¾ gallons per minute, permanent capacity at 200 lbs. pressure on 4 nozzles.

Orchardists, whether on a large or small scale, find every spraying need fulfilled at Buzacott's.

Full particulars and prices on request.

Buzacott & Co.
LIMITED

7-11 Market Street .·. .·. SYDNEY

CLETRAC

TANK-TYPE TRACTOR

Will make Your

Farm or Orchard Pay.

Cletrac
TANK-TYPE TRACTOR

One CLETRAC in the orchard or small farm makes an ideal all-year power plant, is light and powerful, with plenty of pull for heavy ploughing and work in the hills.

Turns short and works the corners clean, compact and low set, ideal for orchard work. Runs on Kerosene.

DOES ANYTHING—GOES ANYWHERE.

Write to-day for particulars—

PACIFIC COMMERCIAL CO.

POMEROY HOUSE

16 York Street - Sydney.

LESS FRICTION

THOSE grunty, creaking, rickety windmills that you often see, are victims of friction. And friction is fatal. It reduces the capacity of the windmill, the bearings become worn and have to be taken up, and the general result is trouble with repairs all the time.

In "COMET" Windmills friction has been reduced to a fine point. This is proved by statements of users whose "COMET" Windmills have been running for years without any real trouble from bearings.

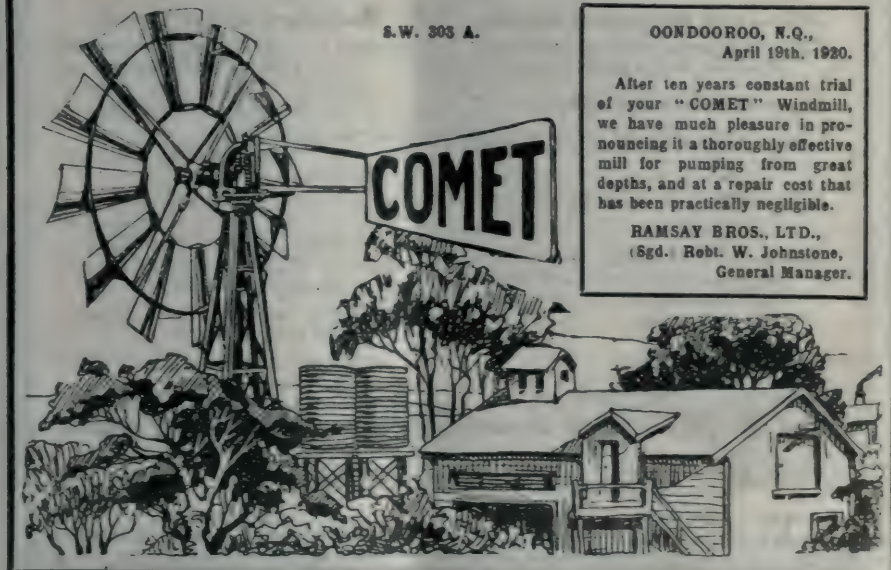
"COMET" bearings are large and of the best material that can be obtained—they work in a continuous bath of oil. The long connecting rod, large diameter shaft, and ball bearing turn-table and other important features which combine to make a "COMET" the windmill of less friction—and longer life.

Send for booklet of testimonials and read what "COMET" users say. Their praise will convince you that a "COMET" is the only mill to buy.

SIDNEY WILLIAMS & CO. Ltd.

Sydney, Rockhampton, Brisbane, Townsville & Hughenden.

S.W. 303 A.



OONDOOROO, N.Q.,
April 19th, 1920.

After ten years constant trial of your "COMET" Windmill, we have much pleasure in pronouncing it a thoroughly effective mill for pumping from great depths, and at a repair cost that has been practically negligible.

RAMSAY BROS., LTD.,
(Sgd.) Robt. W. Johnstone,
General Manager.

Commonwealth Bank of Australia

OPEN FOR ALL CLASSES OF

General and Savings Bank Business

IN THE

PRINCIPAL CITIES and TOWNS of Australia, London (2), and Rabaul (New Britain).

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Cable Remittances made to and Drafts drawn on foreign places direct.

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Banking and Exchange Business of every description transacted within the Commonwealth, United Kingdom, and abroad.

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Conducted at all Branches and at over 3,194 Post Office Agencies in Australia, Papua, New Britain, Solomon Islands, and the Pacific.

Minimum deposit, 1s.

Maximum Interest-bearing Deposit, £1,300.

Rate of Interest, 3½ per cent. on amounts up to £1,000; *3 per cent. in excess of* £1,000 *and not exceeding* £1,300.

Deposits or Withdrawals may be made at any Branch or Agency.

Withdrawals may be made on demand, by post or by telegraph.

Transfers arranged from place to place without loss of interest.

Interchangeable facilities with P.O. Savings Banks in United Kingdom and New Zealand.

PUBLIC SAFE DEPOSIT—SYDNEY.

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STABILITY

The pastoralists of Australia can have no higher goal than this, for stability goes hand in hand with progress and prosperity.

The P.F.A. is an association of pastoralists whose ideals may be summed up briefly as follows:

To encourage production by assisting the producer to obtain a fair return for the labour, money, and risk involved; to stabilise the market and eliminate undesirable fluctuations; to promote the welfare of Australia and help the world back to normal.

With an organisation second to none, and an expert sales force skilled in the marketing of Wool, Fat Stock, Store Stock, and Station Produce, the P.F.A. is in an unique position to help in the achievement of these ideals.

Every progressive pastoralist should take advantage of this service and reap the benefit of mutual co-operation.

The Pastoral Finance Association Ltd.

Phillip Street ∴ ∴ SYDNEY.

Made in Australia.

A HIGH-GRADE

BITUMINOUS FELT FLAT ROOFING

ESPECIALLY MANUFACTURED FOR OUR CLIMATE.

IN ROLLS. 72 feet x 3 feet (216 Square Feet).
INCLUDING TACKS AND CEMENT.

	1 Ply:	2 Ply:	3 Ply:	
Prices:	**35/-**	**45/-**	**55/-**	**per roll.**

FOR BUNGALOWS, HOMESTEADS, STORES,
SHEDS, BARNS, POULTRY HOUSES, Etc.

DOES NOT IN ANY WAY AFFECT THE WATER.

Norman Turnbull & Co., Ltd.,

167 Clarence Street. *Write for Price List of all our Building Materials.*

The MELOTTE
Recommended by
Thousands of users

THE WORLD'S BEST CREAM SEPARATOR.

Recognised by the world's highest authorities
as the most PERFECT CREAM SEPARATOR
The Cleanest Skimmer ∴ Easiest to turn

W. S. FRIEND & CO., Agents, 113 York St., Sydney.

E. C. Elliott Co. Ltd.,

(FORMERLY ELLIOTT, MACLEAN & CO.).

75 Macquarie Street and Circular Quay, SYDNEY, N.S.W.

Notice: The old firm has been entirely reorganised and formed into a Limited Liability Company, with a profit-sharing arrangement with our Employees, thus ensuring that the best services of a highly competent, Expert Staff will always be given to our clients' requirements.

Concrete Mixers, Builders' Machinery and Plant.

Reinforced Concrete Designers and Specialists.

WE ARE SOLE AGENTS FOR

COX'S PATENT AIR GAS PLANTS which use ordinary motor petrol with 98% Air, *which costs nothing*, making the cheapest light in the world.

Absolutely Safe, Simple, Automatic.

NEPONSET PRODUCTS—PAROID and CHALLENGE Roofings are the best Rolled Roofings the world produces.

EVINRUDE PUMPS, with Petrol Engine Combined—for Farm or Domestic use.

WALL SAFES, with Figure Locks, Fire and Burglar Proof.

A Safe Deposit in your own Home.

E. C. Elliott Co. Ltd.,

75 MACQUARIE STREET, SYDNEY.

VINEYARD SPRAYING BY TRACTION
——THE ONLY SATISFACTORY WAY

To Combat Downy Mildew

All our years of experience in supplying sprayers have taught us that

THE AUTO SPRAY No. 15

is the vineyard sprayer that is most satisfactory in every way.

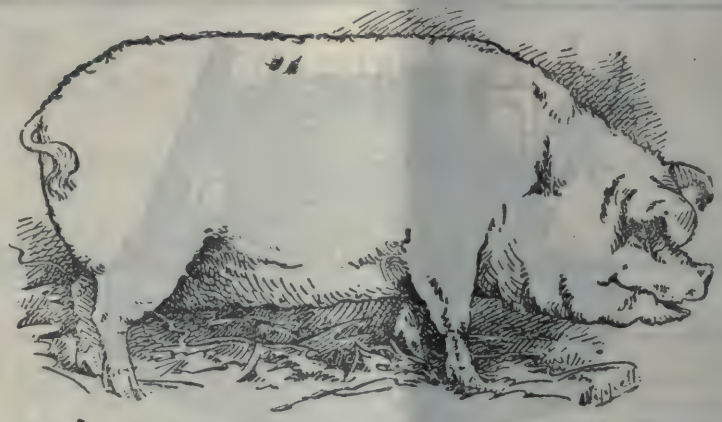
Its simplicity is a big feature. The horse supplies the power. The wheels are made fast to the axle so that as the horse moves the axle turns. A simple eccentric which drives the pump is attached to the axle. This drive is like the drive of a locomotive—positive in its action.

The Auto Spray No. 15 is also adaptable to vegetable or orchard spraying. It lasts a lifetime.

Complete specifications and full particulars on request.

Buzacott & Co. LIMITED

7-11 Market Street ——— Sydney.



10/- Pig worth £20

thanks to Karswood Pig Powders

The following letter from a discharged soldier is of great interest to pig raisers. In this case a few shillings spent on Karswood Pig Powders not only saved the pig, but turned it into a fine fat porker worth £20. Sickly pigs and Karswood Pig Powders do not go together. Karswood soon puts them right, as thousands of users agree. Karswood Pig Powders clear worms away in no time, enabling pigs to relish their food and thrive all the time. Read the letter on this page and be convinced.

HERE IS THE STORY.

Christopher Road,
Alford, Lines, England.

"I have great faith in Karswood Pig Powders. When I came home in February, 1919, after being discharged from hospital through wounds, my wife had bought a pig which to all appearances was only walking to save funeral expenses. I tried putting it in a warm place and coddling it a bit, but no change. I saw your advertisement for Karswood Pig Powders and what they had done, so I decided to give them a trial. I got a packet and started giving the pig two a week. After a week or two the pig seemed more contented and began to improve, so I determined to keep on with Karswood Pig Powders, and, take it from me, I did not regret it, as by the end of the year that pig which I would not have given 10/- for when I came home, was worth over twenty pounds (£20)."

5th April, 1920. W. REDFORD.

SIZES AND PRICES.

Karswood Pig Powders are sold by Australian dealers at 1/4 per packet of twelve powders (with a valuable booklet on pigs, illustrated, in each packet). If your local storekeeper or produce dealer does not supply, write to the Wholesale Agent (see address below), who will send you the address of a dealer who does sell them, and see that you are supplied.

Agents for New South Wales:

COASTAL FARMERS' CO-OP. SOCIETY LTD.

QUAY STREET, SYDNEY.

NOTE.—Karswood Pig Powders are made in Manchester, England, by E. Griffiths Hughes Ltd., established 1756, *in the reign of George the Second.*

WHEN RABBITS ARE TROUBLESOME

USE THE

"SUDDETH"

Rabbit Fumigator and Smoker

Everyone who has used a "Suddeth" has a good word for it, because it gives results.

Over 6000 are giving satisfaction all over Australia.

Outside Australia the "Suddeth" can be found in

Canada
New Guinea
Java
India and
Scotland (Gullane Golf Club).

What you require to beat the rabbits is—

	£	s.	d.
1 No. 2 Suddeth and Smoker	7	0	0
1 Box Suddeth Smoke Mixture	0	15	6
1 Drum Carbon Bisulphide, 5 gallons...	2	18	0

CATALOGUE WILL BE POSTED ON REQUEST.

OTHER STATES WRITE TO—

VICTORIA ..... NEWELL & CO., 189 King Street, Melbourne.
S. AUSTRALIA ..... ELDER SMITH & CO., Ltd., Adelaide.
W. AUSTRALIA ..... FEDERAL TRADING & ENGINEERING CO., Perth.
QUEENSLAND ..... WAUGH & JOSEPHSON, Brisbane.

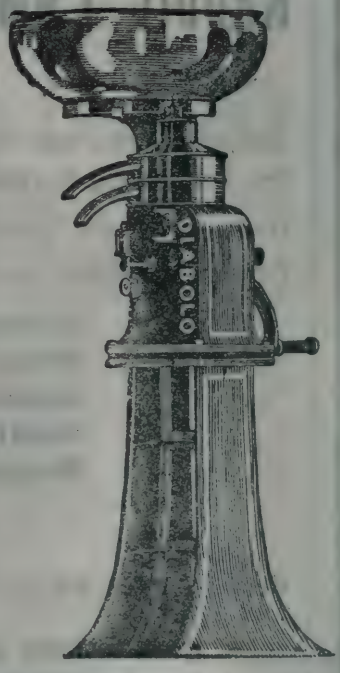
F. S. GREER, *Patentee and Manufacturer, 102 Sussex St., Sydney.*

Best thing on the Dairy Farm

BECAUSE the Diabolo prevents any waste of cream—and money—it is the best thing you can have in your dairy.

Every vital feature for close skimming, smooth running, and quick, easy cleaning, is built into the Diabolo by the world's largest separator factory, and the enormous production explains the low price.

There's lifelong service in every Diabolo because of the strong construction and high quality of materials used. One cow, or one hundred, there is a Diabolo for your needs. Write now for prices and particulars.



Diabolo Separator Co.

LIMITED

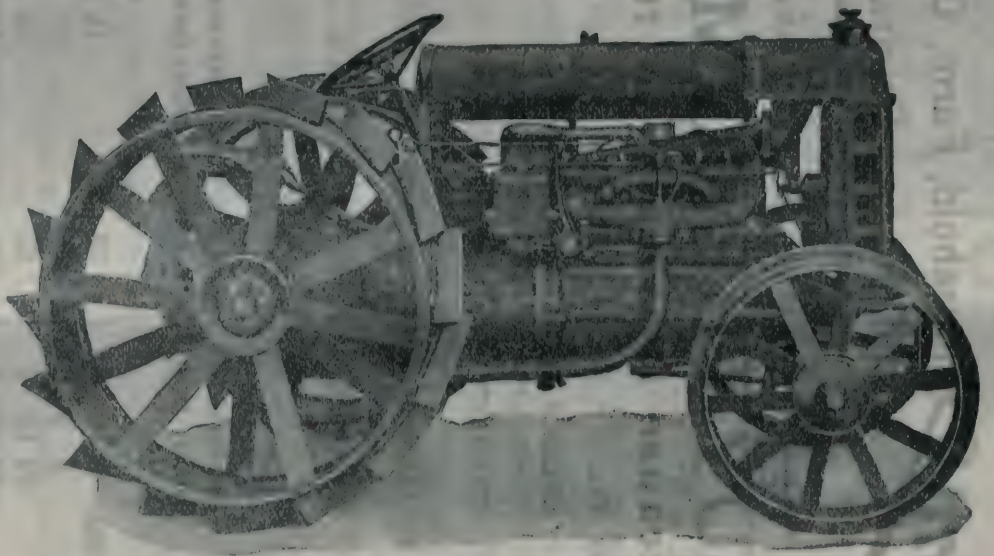
Corner MARKET and KENT STS., SYDNEY

DIABOLO SEPARATOR

D.C. 107 A

Fordson Tractor.

WHEN you are short of labour and your boy or girl is eager to help ——



That's when a farmer needs a FORDSON.

Write to-day for particulars—

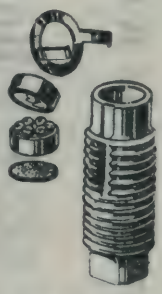
MOTOR TRACTORS LTD., 112-114 Hunter St., SYDNEY.

Domo Household, Farm, Dairy and Power Separators

If a separator is heavy to turn it is wearing out quickly

BUY THE DOMO
because it is easy to turn

THE REASONS ARE—



This illustrates Ball-bearing bottom screw of Models 13 to 26.

SPLASH LUBRICATION—All works running in oil; no oil holes anywhere.

CORRECT GEAR RATIO makes the separator turn slower and with less exertion.

HANDLE SPEED is less than that of most good separators.

BALL-BEARING BOTTOM SCREW contains a properly constructed ball-bearing race, with five to six ball-bearings.

Weight of bowl is not carried on solid point or single ball-bearing

	£	s.	d.		£	s.	d.
9 gall. (discless)	6	10	0	35 gall. - -	16	10	0
12 „ „ -	8	5	0	45 „ - -	21	0	0
18 „ - -	10	10	0	65 „ - -	30	0	0
22 „ - -	12	10	0	105 „ - -	41	0	0
30 „ - -	14	10	0	135 „ - -	47	0	0

SERVICE Domo Agents in every important town. Travellers visit North and South Coast dairying districts regularly.

The DOMO SEPARATOR COMPANY

Third Floor ∴ 70 Wentworth Avenue, SYDNEY

BRUNTON'S Buffalo Oval Fencing Wire

HEAVILY GALVANISED.

Miles Cheaper than Black Wire.

Requires no Restraining and will not Sag.

Brunton's Buffalo Fencing Wire is manufactured in Scotland, and tested to be 350lbs. stronger than No. 8 Gal.—1653 yards to the cwt. **Brunton's Buffalo** is guaranteed the Best and Cheapest.

SAVING IN FIRST COST
AND **66%** IN FREIGHT AND HAULAGE

We have Large Supplies for Immediate Delivery. ORDER EARLY.

GIBSON & SONS, Sole Agents for Australia, **379 Kent St., Sydney**

REX FLINTKOTE ROOFING

The Best Bituminous Roofing on the World's Market.

Sold in Rolls 32 inches wide by 81 ft. long.

1-ply, per roll, complete with cement and nails					...	51/6
2-ply	"	"	"	"	...	63/6
3-ply	"	"	"	"	...	77/6

1 roll of Rex Flintkote Roofing covers 200 square feet, or the same space that 17 sheets of iron covers.

The Ideal Roofing for Homes, Factories, Farm Buildings, etc.

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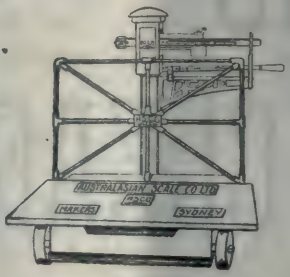

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3	—18 „	... 10	0	0	„	8	0	0	... 2	0	0
4	—22 „	... 11	0	0	„	8	16	0	... 2	4	0
5	—30 „	... 13	0	0	„	10	8	0	... 2	12	0
6	—33 „	... 15	0	0	„	12	0	0	... 3	0	0
6c	—33 „	... 15	10	0	„	12	8	0	... 3	2	0
7	—45 „	... 19	5	0	„	15	8	0	... 3	17	0
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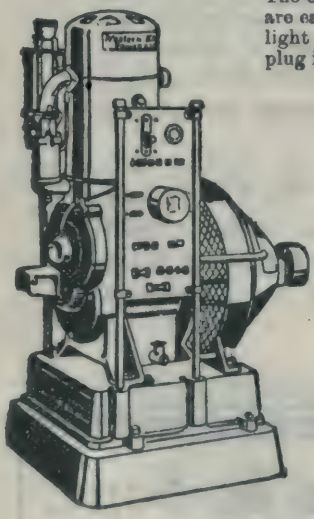

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Vol. XXXII. Part 8. *AUGUST 2, 1921.*

THE

AGRICULTURAL GAZETTE

OF

NEW SOUTH WALES.

Issued by Direction of

THE HON. W. F. DUNN, M.L.A.,

MINISTER OF AGRICULTURE.

W. H BROWN, *Editor.*

By Authority:

SYDNEY: W. A. GULLICK, GOVERNMENT PRINTER.

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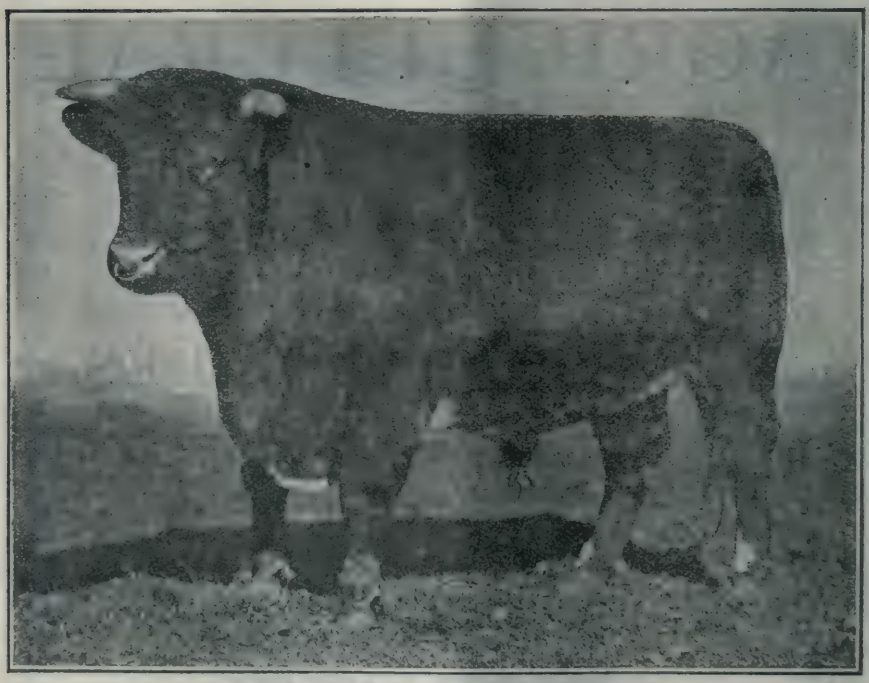

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2nd August, 1921.

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Retford Park Jerseys

Owned by SIR SAMUEL HORDERN.

"PROMETHEUS" (Imp.) **Colour—Practically Whole.**

Calved February 6th, 1917. Sire—"MALVOLIO" 11417. Dam—"PROMISE" Vol. XX, p. 408.

"PROMISE"—Dam of "Prometheus" averaged 8967 lbs. of milk for 7 years, and won the following prizes in Butter Tests:—2 First Prizes, 2 Gold Medals, 1 Second Prize, 1 Silver Medal, 1 Fourth Prize, and 5 Certificates of Merit. In Milk Prizes she won 1 First Prize, 2 Second H.C., R.N., H.C., H.C. at various Shows, 1909 to 1913.

"POST ORBIT"—Grand Dam of "Prometheus" won in Butter Tests 4 First Prizes, 3 Gold Medals, 4 Second Prizes, and 2 Silver Medals, 3 Third Prizes and 2 Bronze Medals. In Milk Trials she won 4 First Prizes, 4 Second Prizes, R.H.C., H.C., at various Shows, 1906 to 1914. She yielded 93,994 lb. Milk in 9 years; average, 10,656 lb. per year. She also won 22 Prizes in classes, including 6 Firsts and 2 Blythwood Bowls. **His Sire's Dam** "Mrs. Viola" won E.J.C. Certificate of Merit in Butter Tests 1905, 1906, 1909, 1911; her average yield of Milk was 9,098 lb. per year for six years; she also won 6 Firsts and 1 Champion Prize, 1906 to 1911. **Sire's G. Dam** "Marigold XV" won in Butter Tests 3 Gold Medals and 3 First Prizes in Milking Trials, 1906 to 1910; her average milk was 9,448 lb per year for 12 years.

Full Particulars from—

The Manager, Retford Park, Bowral, N.S.W.

VOL. XXXII. PART 3. AUGUST 2, 1921

Agricultural Gazette of New South Wales. 533

Varieties of Maize and Potatoes.

RECOMMENDATIONS BY THE DEPARTMENT OF AGRICULTURE.

THE Department has recently revised the list of varieties of maize and potatoes recommended for various districts, based on the results of experiments which have been carried out throughout the State :—

Classification of Maize Districts.

The maize districts of the State are classified as follows for the purpose of these recommendations :—

1. Upper North Coast, comprising the Tweed, Richmond, Clarence, Bellinger, and Nambucca Rivers.
2. Middle North Coast, comprising Macleay, Hastings, and Manning Rivers.
3. North Coast Tablelands, comprising Dorrigo and Comboyne districts.
4. Central Coast, comprising the county of Cumberland, and the Hunter and Hawkesbury Rivers.
5. Illawarra, Shoalhaven and Milton districts.
6. Moruya and Tilba districts.
7. Bega district.
8. Northern Tableland, comprising the Tenterfield, Glen Innes, and Armidale districts.
9. Central Tableland, comprising the Bathurst district.
10. Southern Tableland.
11. Inverell district.
12. Tamworth and Upper Hunter districts.
13. Western Slopes, comprising the Molong, Manildra, Mudgee, Canowindra, and Coonabarabran districts.
14. Tumut district.
15. Murrumbidgee Irrigation Area.

Varieties of Maize Recommended for Districts.

For Grain— UPPER NORTH COAST.

Early crop—Leaming.
Main crop—Large Red Hogan, Fitzroy, Ulmarra Whitecap, and Leaming.
Second-class soils—Hickory King and Leaming.
Blight resistant variety, for December sowing—Fitzroy.

For Green Fodder—Fitzroy.

For Grain— MIDDLE NORTH COAST.

Early crop—Golden Superb, Funk's Yellow Dent, and Craig Mitchell.
Main crop—Fitzroy, Large Red Hogan, Ulmarra Whitecap, Golden Beauty, and Leaming.
Second-class soils—Hickory King, Leaming, and Golden Nugget.
Blight resistant varieties, for December sowing—Fitzroy and Golden Nugget.

For Green Fodder—Fitzroy.

For Grain— North Coast Tablelands.
Leaming, Small Red Hogan, Golden Superb, and Golden Nugget.
For Green Fodder—Fitzroy.

For Grain— Central Coast.
Early crop—Funk's Yellow Dent, Iowa Silvermine, and Craig Mitchell.
Main crop—Fitzroy, Ulmarra Whitecap, and Large Red Hogan.
For Green Fodder—Fitzroy.

For Grain— Illawarra, Shoalhaven, and Milton.
Early crop—Funk's Yellow Dent, and Goldmine.
Main crop—Leaming, Fitzroy, Large Red Hogan, and Boone County White.
For Green Fodder—Fitzroy.

For Grain— Moruya and Tilba.
Early crop—Funk's Yellow Dent.
Main crop—Boone County White, Large Red Hogan, and Yellow Moruya.
For Green Fodder—
Fitzroy.
On lighter hillside soils—Hickory King.

For Grain— Bega.
Early crop—Iowa Silvermine, Goldmine, and Funk's Yellow Dent.
Main crop—Fitzroy, Large Red Hogan, Boone County White, and Yellow Mastodon.
For Green Fodder—Fitzroy.

For Grain— Northern Tableland.
Wellingrove and Funk's Yellow Dent.
For cooler districts—Golden Glow.
For Green Fodder—
Early sowing—Leaming and Hickory King.
Late sowing—Wellingrove.

For Grain— Central Tablelands.
Alluvial soils—Funk's Yellow Dent and Iowa Silvermine.
Upland soils—Wellingrove. Funk's Yellow Dent, and Iowa Silvermine.
For colder districts—Golden Glow, Silver King, and U.S. No. 133.
For Green Fodder—
Leaming and Hickory King.

Southern Tableland.
For Green Fodder—
Early maturing crop—Leaming and Hickory King.
Late maturing crop—Fitzroy.

For Grain— Inverell.
Main crop—Funk's Yellow Dent and Iowa Silvermine.
For later sowing—Wellingrove.
For Green Fodder—Leaming and Fitzroy.

TAMWORTH AND UPPER HUNTER.

For Grain—
Alluvial soils—Funk's Yellow Dent.
Upland soils—U.S. No. 133.

For Green Fodder—
Leaming and Fitzroy.

WESTERN SLOPES.

For Grain—
Alluvial soils—Funk's Yellow Dent, Iowa Silvermine, and Early Clarence.
Upland soils—Funk's Yellow Dent, Iowa Silvermine, U.S. No. 133 (for September or December sowing).

For Green Fodder—
Leaming and Fitzroy.

TUMUT.

For Grain—
Alluvial soils—Early Clarence, Funk's Yellow Dent, and Craig Mitchell.
"Plain" country—Leaming, Funk's Yellow Dent, and Iowa Silvermine.

For Green Fodder—Fitzroy.

MURRUMBIDGEE IRRIGATION AREA.

For Grain—
Iowa Silvermine and Funk's Yellow Dent (December sowing recommended).

For Green Fodder—Fitzroy.

VARIETIES OF POTATOES RECOMMENDED.

NORTH COAST, CENTRAL COAST, AND SOUTH COAST.

Early Manhattan, Up-to-Date, Satisfaction, Early Manistee, and Carman No. 1.

NORTH COAST PLATEAU (Dorrigo and Comboyne).

Langworthy, Factor, Up-to-Date, Coronation, Carman No. 1, and Queen of the Valley.

NORTHERN TABLELAND.

Coronation, Factor, and Queen of the Valley.
For second-quality soils—Surprise.

CENTRAL TABLELAND.

Factor, Queen of the Valley, Manhattan, Carman No. 1, and Surprise (in addition, Early Rose for Oberon).

SOUTHERN TABLELAND.

Factor, Up-to-Date, Early Manhattan, Queen of the Valley, and Early Manistee.

For second-quality soils—Magnum Bonum.

SOUTH-WEST TABLELAND (Batlow, Tumbarumba).

Factor, Up-to-Date, Coronation, and Carman No. 1.

MURRUMBIDGEE IRRIGATION AREA.

Up-to-Date, Manhattan, Factor, Early Manistee, and Carman No. 1.

Nomenclature of Maize Varieties.

H. WENHOLZ, B.Sc. (Agr.), Inspector of Agriculture.

SOME varieties of maize which have been grown by the Department of Agriculture at the experiment farms have been going under ambiguous names, and it is desired that they should be properly named, so that they may become better known.

In addition, names are also proposed here for some local varieties of merit which have been going under misleading names, or have not been hitherto definitely or expressly named.

Fitzroy (formerly Improved Yellow Dent).—This variety is becoming one of the most popular varieties of maize on the coast both for grain and green fodder. It originated at Grafton Experiment Farm, and is still grown there, having been greatly improved in type during recent years. Owing to the ambiguity of its name, which might be applied to any Yellow Dent maize, a change in designation was desirable. The new name is after a county on the North Coast.

Wellingrove (formerly Early Yellow Dent).—This variety is becoming widely grown on the Northern Tableland, and owing to other Yellow Dent varieties of early maturity being confused with it, it was decided to confer upon it the name given, which has an intimate connection with the location of the Glen Innes Experiment Farm, from which this variety is largely distributed.

Ulmarra White Cap.—This is the name now applied to a variety, which is really a crossbred maize, having a yellow colour and a pale white cap round the dent end of the grain. Owing to its high-yielding capabilities, this variety now takes its place amongst the Department's recommendations on the North Coast. Though it is largely grown on the Clarence River round Ulmarra it has no particular name, but is sometimes referred to as White Cap or White Cap Horsetooth. It is felt that the new designation will more definitely locate and more aptly describe the variety.

Large Red Hogan.—This name is now to be given to the "Red Hogan" maize, which is largely grown on the Hawkesbury River, and which is distributed from Hawkesbury Agricultural College. The new designation is necessary to distinguish it from other types of Red Hogan, such as a narrow-grained type and a small early type.

Manning Silvermine.—This variety has been brought to light by the Manning River maize-growing competitions. It is considered to be the result of a cross between Manning White (a local variety) and Iowa Silvermine, which was introduced from America. It differs from the latter by a later maturity, and a wider furrow between the rows of grain on the cob.

Iowa Silvermine.—To distinguish it from other strains of Silvermine it is preferred to keep to the prefix Iowa for this variety, which was originally introduced from America.

Popular Descriptions of Grasses.

[Continued from page 196.]

E. BREAKWELL, B.A., B.Sc., Agrostologist.

The Wire Grasses.

THESE belong to the genus Aristida. They are called Wire grasses on account of the hard, wiry character of the stems, and, in many cases, of the leaves of the plants.

The genus is fairly common over the warm temperate regions of the world, but usually occurs on the harder or poorer class of soils. In the United States of America, where these grasses are sometimes called Needle grasses or Poverty grasses, many of them serve a useful purpose in the rough hilly pastures, and are often appreciated by stock. In this State, however, only one genus (*Aristida Behriana*), which occurs abundantly on the harder soils of the Riverina, can be said to provide useful feed, and then only in its young stages.

In New South Wales the Wire grasses are common in the warm months on the shaly or sandstone soils of the coast, and on local barren patches on the mountains, tablelands and interior. The drier and more barren the locality the more developed is the wiry character of the grass, and, in the cases of *A. vagans*, *A. ramosa*, and *A. calycina* the flag is small in extent and extremely harsh.

The seeds of the Wire grasses differ from those of the Spear or Corkscrew grasses in having three awns, instead of one, attached. This inhibits the penetrative action on the skin of animals, so usual in the Corkscrew grasses. The free ends of the seeds, however, are generally very sharp, and can do a good deal of damage in the eyes and jaws of stock.

Barley Grasses.

These grasses all belong to the genus Hordeum, of which our cultivated barley (*Hordeum sativum*) is a representative. The commonest species in New South Wales are introduced; they are, *Hordeum murinum* (the common Barley grass) and *Hordeum nodosum* (called Bastard Barley grass, on account of a mistaken idea that it has resulted from a cross between ordinary Barley grass and some other species.)

Barley grass (*Hordeum murinum*) was one of the first grasses that appeared when wheat-growing was introduced, and is probably forty years old as far as this State is concerned. No grass has spread throughout our cereal and partly cultivated pastoral areas, both on the tablelands and in the interior, as this one has done. Whereas Burr trefoil (*Medicago denticulata*), another

Fig. 1.—*Aristida Behriana*.
Note the three awns or bristles attached to each seed. In the Corkscrew (*stipa*) grasses there is only one.

Fig. 2.—On the left, Barley Grass (*Hordeum murinum*); on the right (*Hordeum maritimum*).

The bunch of flowers at the top of the plate is *H. maritimum*. Note that only the central flower is fully developed.

common introduced plant, is more abundant on the slopes than on the elevated tablelands, Barley grass shows no distinction as far as winter temperature is concerned, dry conditions alone affecting it. With good autumn rains Barley grass appears early, and by winter time has practically taken possession of the deep soils. If wheat lands have not been well fallowed, a late sowing will often result in the wheat and Barley grass fighting for supremacy. For the same reason, if the land is not thoroughly cleaned, lucerne sowing in autumn is not advocated in the interior, as Barley grass and other herbage does a considerable amount of damage during the slow winter growth of the lucerne. It is extremely difficult to eradicate the young plants by cultivation, as owing to the fibrous character of the roots, it will retain its vigour with the slightest hold of the soil, being somewhat similar to ***Poa annua*** in this respect.

Barley grass has certainly come to stay until much more intense cultivation and thorough fallowing methods are carried out. The most luxuriant growth occurs on the western slopes, where it forms dense clumps that grow 2 feet high in the spring. It makes its growth much later on the more elevated tablelands, and appears at its best about November. If the mature plants are ploughed up before seeding on cultivated lands it can be controlled, but in pastures where it seeds so thickly in good seasons, its eradication is practically impossible.

A great deal has been written, and a good deal of data obtained, in connection with the fodder value of this grass. Chemical analysis and other investigations show that it rapidly loses in feeding value on the approach of maturity. In its young stages, however, it provides excellent winter feed. Such succulent feed is particularly useful for the lambing ewes, and in a normal season three to four sheep per acre can be carried on it during a short period of the year.

The seeds of Barley grass are a constant source of trouble, and they prejudice most pastoralists against the plant. The stiff sharp points of the seeds penetrate the jaws, eyes and nostrils of stock, producing in many cases bad sores and decay of the facial bones. The ripe seeds easily break away from the plant, and often lie in thousands per square foot of soil surface. In such cases it is often convenient to burn the pasture at the end of the season.

Hordeum nodosum is a much smaller grass than the ordinary Barley grass, and has finer and shorter bristles to the seed. It is also distinguished by the fact that two of the series of three attached flowers are often considerably reduced, sometimes taking on the form of extended awns. This grass is very common in the Riverina and Blacksoil Plains.

A promising perennial Barley grass is *Hordeum bulbosum*, now in cultivation at Hawkesbury Agricultural College. It grows to a height of 6 feet, yields heavily, and is fairly succulent in texture.

Fig. 3.—On the left, Wheat Grass (*Agropyrum scabrum*); on the right, Combed Wheat Grass (*Agropyrum pectinatum.*)

Note the decided distinction between the flowers of the two species.

Wheat Grasses. (*Agropyrum* sp.)

These are well-named Wheat grasses, as, botanically speaking, they are indistinct from the genus Triticum, of which our cultivated wheats are representative. The Wheat grasses, however, are characterised by being perennial in habit, while the ordinary wheats are of course annual.

The Wheat grasses are very common throughout the temperate regions of the world. The commonest species of all is *Agropyrum repens*, the well-known English couch or quack grass. This grass has underground creeping rhizomes, which possess great vitality, and which are extremely difficult to eradicate. Fortunately it has so far not obtained a hold in this State. An attempt has been made by some people to introduce it, on account of the medicinal value of the roots.

The United States of America possess some valuable Wheat grasses in *Agropyrum Smithii* (Colorado Bluestem), *A. spicatum* (Bunch grass), and *A. tenerum* (Slender Wheat grass). These provide a considerable amount of pasture in the western regions.

The Wheat grasses common to this State are *A. scabrum*, *A. pectinatum*, and *A. velutinum*.

Agropyrum scabrum (Wheat grass) is by far the most abundant. It is common on coast, tablelands, and interior. Owing to its cosmopolitan character it is extremely variable in habit. On sandstone country and on infertile soils it develops very harsh leaves and stems, while on the better soils it is generally extremely succulent. Wheat grass seldom dominates large areas, being content to grow in association with other natives. It is often abundant on the headlands of cultivated lands, on the banks of creeks, and on roadsides. It is a grass that responds well to cultivation, producing large clumps, with succulent flag and stem. It is extremely valuable for winter and spring feed in the coldest of situations.

Agropyrum pectinatum, sometimes called Combed Wheat grass, is mostly confined to the elevated south-western and western portions of the State, such as Cooma, Nimitybelle, Delegate, Blayney, and Gulgong. The grass is characterised by the manner in which the mature flowers align themselves almost at right angles to the stem. Although very palatable, it does not produce nearly the same amount of feed as *Agropyrum scabrum*.

Agropyrum velutinum is also found in cold districts, but produces very little feed.

Fumigation *versus* Spraying for Scale Insects

The Department's experience is that sprays for scale insects are faulty. Even the best of them are inconsistent in their effects, giving satisfactory results on some trees and poor ones on others. Where fumigation is faithfully carried out it is most reliable and consistent in the results. When fumigation was first introduced years ago, some large citrus growers were rather sceptical of the method, but the same growers soon after the initial test adopted fumigation, and have been among its strongest advocates.—W. J. Allen.

The Feeding of Sheep in Times of Drought.

[Concluded from page 496].

[At the termination of the 1919-20 drought, circulars were issued by the Stock Branch with a view to the collection of information on the methods of feeding sheep during the preceding months of scarcity. Valuable information was provided by several stock inspectors and others, particularly by Mr. C. J. Woollett, Stock Inspector at Tamworth. From these replies and other sources, the following excellent article has been compiled by Mr. W. L. Hindmarsh, B.V. Sc., D.V.H., one of the Veterinary Officers of the Branch.—S. D. Symons, Chief Inspector of Stock.]

Green Fodder.

It seems almost an absurdity to refer to the feeding of green crops to sheep during the drought, but where irrigation is possible, it is quite feasible as the following report from a southern district will show:—

Fifteen hundred young crossbred sheep, two, four, and six-tooth ewes and hoggets, were divided into six feeding lots of 250 each. They were fed for twelve out of fifteen months on lucerne, Sudan grass, and barley, all green fodder grown under irrigation on the farm at a cost of 2d. per head per day. They just about held their own, the wool fairly well grown but dry and earthy. Their value at the end of the drought was £2 10s. per head all round. The cost of food per animal was £3 0s. 10d. Some of the feed was sold, and this more than made up for the loss of 10s. per head on the sheep. Away from the river this could not have been attempted, and the cost of feeding would have been great. Lucerne hay was £14 a ton on the trucks.

Other Foods.

Various other foods obtainable locally during the drought were used. Pumpkins and melons were reported upon in one district where they were cheap enough to be fed. They contain a large percentage of water and of the two pumpkins are to be preferred. About 2½ tons of pumpkins are reported to be equal in nutritive value to 1 ton of maize ensilage. The vines when green are good food, but when dry they are very liable to cause death from impaction of the bowels. Pickling onions were used in one case with fair success while they lasted, but the amounts given were not specified. In another instance cabbages that had gone to seed kept sheep in condition while they were available. In America cabbages are prized by some shepherds in preparing stock for the market, but they are too expensive as an article of diet for large numbers of stock. Potatoes have also been fed to sheep with good results. If employed they should not constitute more than one-half of the ration.

Mangolds and turnips were also used, but as with the previously mentioned vegetables, they are not favoured owing (said one report) to the very large quantity necessary (on account of the great percentage of water) and the cost of carriage. Turnips are largely used as a sheep food in England in winter with good results, and if they are available at a reasonable price they should make an excellent drought food.

Bran and pollard are usually too expensive to use for sheep, and (owing to the improvements in milling machinery) they do not contain much nourishment. They are, however, useful when mixed with other foods, since they both contain a large percentage of crude protein matter.

Oil cakes and meals were not reported upon except in a few cases, where they were mixed with other foods. Linseed has always been recognised as a splendid stock food when used judiciously; hence in the above cases the results were reported to be satisfactory. Oil cake broken up to pieces about the size of an almond (known as "nuts") was supplied by certain firms About three ounces of these per sheep per day were fed by broadcasting. The sheep ate them readily and responded well to the additional ration. keeping in fair condition during the dry spell.

Mixed Foods.

From the perusal of the attached reports it will at once be seen that the best results have been obtained from feeding on a mixed ration. It has already been pointed out that no one food is sufficient to keep sheep in good health, for under normal circumstances sheep graze over a wide area, where the feed is varied. According to the season, certain plants will be young while others will have reached seeding stage, and even in the summer months the dried grass and herbage will be accompanied by the seed of various plants. To put sheep on to a limited ration of either scrub, hay, or grain alone and expect them to thrive is not reasonable. The following statements (taken from the reports received from sheepowners in the districts mentioned, each paragraph being an extract from a separate letter) support this view :—

New England.—We bought hay and corn, and started to feed a week after the ewes started lambing. It was rather late; this should have been done while they were strong; 6,142 lambs were reared from 11,428 ewes. A lot of the hay was very bad, or the results might have been 20 per cent. better. The ewes being fed, and condition being kept up, the next lambing was a big one—101 per cent. from 8,000 ewes.

Boiled wheat and scrub (principally mulga) gave better results than hay and corn. Corn is a very fine feed for sheep, especially if started before lambing.

Northern Plains.—Boiled wheat, to which a fair quantity of molasses was added . . . was mixed with chaff and fed. Average for sheep daily was ½ lb. wheat and ¾ lb. chaff. Fed from troughing. Twenty thousand sheep fed for twelve months with good results. Breeding ewes did very well; young lambs did not do so well.

Hand-fed 10,000 ewes on wheat, 4 oz. per day per sheep. After a period they were put on to scrub, and then again on to wheat. The successive alternation on wheat and scrub and the judicious drafting of weaker sheep on to wheat gave generally satisfactory results, but was unsatisfactory with the lambing ewes, where mortality was high.

Western Plains.—Half-pound grain (maize or wheat) and scrub kept sheep in condition, and some owners lambed 30 per cent.

Southern Tablelands.—Fed 1,500 dry sheep daily for six weeks with salt, 200 lb., wheat, 200 lb., linseed meal, 100 lb., chaff, 2 bags (daily ration for 1,500 sheep). The results were good.

Lambing ewes were fed on ordinary hay, including lucerne hay. Four gallons of molasses, diluted with water, and five bags of bran were mixed and fed to the ewes in troughs twice weekly. This gave good results.

Northern Tablelands.—Fed six to eight-week old lambs, not reared by the ewes, two-thirds kerosene tin of corn (dry) and two kerosene tins of bran (corn boiled before used). Fed this amount twice daily to 200 lambs. Loss was less than 5 per cent.

In 1918 I fed 600 Merino and crossbred in-lamb ewes on one bag of corn and 200 lb. of lucerne daily. The ewes did well, and marked 75 per cent. of lambs. I lost only a few sheep.

I fed 800 crossbred ewes on three-quarter bag corn, three-quarter bag bran, three-quarter bag wheat, and seven bags of chaff daily, with an extra bag of bran once per week. I reared 100 per cent. lambs. The corn and wheat I boiled, and commenced feeding while they were in good condition.

We found that ewes produced more milk on a ration of wheat, salt, and box leaves than on lucerne hay, chaff, and maize, although the conditions were worse in 1919 than in the previous year.

I gave one and a half bags corn and 2 cwt. lucerne hay to 1,000 ewes daily. They ambed all right, but when the lambs were two months old they died down to 40 per cent.

Fed 900 ewes (700 crossbred and 200 Merino). Feeding commenced a week before lambing, and was continued seven weeks. I gave 3½ tons lucerne hay and 1½ tons wheaten chaff per week, together with two bags daily of crushed wheat. The ewes did well. The lambs would improve for a week or ten days, and then they would fall away and become poddy. I marked 420 lambs from the crossbreds, but only forty-two from the Merinos. I lost twenty-five of the Merinos, although they had the better care and attention.

We fed 500 ewes and lambs for four months on bushes, together with 6 oz. of bran and pollard daily, with good results. These sheep would not have done on bushes alone.

In 1917 we fed 500 Merino ewes in lamb. We started with 4 to 4½ oz. maize daily, scattered. This was unsatisfactory. We then fed in wooden troughs 12 bushels of steeped maize, one bag of bran, and about 100 lb. of lucerne chaff daily. We marked 330 lambs, but lost fifty ewes. In 1918 we fed 600 Merino ewes on a daily ration of one bag of steeped wheat, one bag of bran, 1 cwt. of good wheaten chaff. We marked 460 lambs, and lost thirty ewes.

Nine hundred crossbred ewes were fed a fortnight before lambing as follows:—(1) 400 fed on lucerne hay and corn, hay sprinkled with molasses and corn broadcasted. Fed twice a day, giving half a kerosene tin of corn and a small spring-cart of hay. Ewes, did well, but a number of lambs died, as ewes did not have sufficient milk. (2) 500 fed on chaffed lucerne hay sprinkled with molasses and fed in troughs. Sheep had four wheat bags of chaff and two kerosene tins of corn. To this I added epsom salts and salt twice a week. These ewes made more milk, very few lambs dying.

I gave 1 lb. chaff and ¼ lb. wheatmeal daily sprinkled with salt water and molasses. This will keep a sheep strong and healthy. When lambs are six to eight-weeks old you can feed them this way with their mothers with feed in bag troughs. To feed dry sheep, 3 oz. of maize per day, as well as filling up with box and apple leaves, will carry them on for months, but they need some laxative lick. We fed 15,000 to 20,000 at times during the drought.

METHODS OF FEEDING.

When scrub is to be fed, it may be lopped as required. One man can lop sufficient for 800 to 1,200 sheep, according to local conditions. Ensilage and hay may be (*a*) scattered through the paddock, a hard dry spot being selected as a site and frequently changed, or (*b*) fed from troughs. The first-mentioned is not an altogether satisfactory method, as the feed may be trodden into the dust and wasted. Trough feeding is the better and more economical method. Especially is trough feeding necessary if the feed has been damped; otherwise earth and sand will adhere to it.

Troughs may be made (*a*) of bags or hessian, or (*b*) of boards. If bags or hessian are used, the trough should be so contrived as to prevent the bottom being lifted by the wind and the food thrown out. A wire running the full length of the inside of the trough will prevent this. The disadvantage of bag troughs is that with constant use they rapidly wear out. To make a board trough, peg two 6 or 8 in. planks into the ground in a vertical position about 8 inches apart, and water and ram the earth between to make a hard bottom. A rider is necessary in this case to prevent the sheep from getting into the trough.

It is essential that chaff be fed from a trough. Grain, too, is preferably to be fed from the trough, though it may be broadcasted on to hard dry ground. In trailing or broadcasting there is less waste with maize than with the smaller grains. When trailing it is advisable to drive in a circular or a U-shaped track. This gives the weaker sheep a chance to get their share.

The following reports (taken from the letters received from sheepowners in the districts mentioned, each paragraph being an extract from a separate letter suggest some other methods of feeding which might be adopted where suitable :—

Southern Tablelands.—Troughs should be made of hessian, hung on small posts, with a wire run along the bottom of the trough to prevent it being blown up by the wind. Each trough should be 100 yards long for every 500 sheep.

Central Tablelands.—Hay racks may be made by bending a roll of wire netting, about 2½ inch mesh, between the poles and fastening it securely at each side. A roll will go 90 yards. The bottom in the netting should not be more than 1 foot off the ground. All hay should be fed from racks.

Southern Plains.—A good troughing can be made of hessian, sold in rolls 50 yards by 6 feet wide. This, split down the centre, makes 100 yards of troughing. When erecting, fasten it well down at the bottom at each pair of posts. This prevents the bottom being lifted by the wind. Two hundred yards of troughing are required for 1,200 ewes. It may be necessary to separate the weak.

The troughs may be arranged in parallel lines or in square formation, says the writer of this report. From the sketch provided, it appears that if the troughs are arranged on the square, the troughing forming the sides should not meet at the corners, but should leave room for the sheep to move in and out of the square, and to approach both sides of the troughs. If the troughing thus forming the incomplete sides of the square measures 50 yards, the space across the corners should be 15 yards.

Northern Plains.—Good results from feeding grain from sheets of iron. The roof of the shearing shed was removed and the sheets of iron placed end to end. The grain was scattered along this. By this means the contamination of the food with earth and sand was avoided.

Preparation of Food.

Reference has already been made to the necessity for the addition of molasses, salts, &c., to the food. When it is decided to steep the food beforehand a solution of these medicaments will be found useful. In some cases food may be available which, owing to its inferior quality or to deterioration, should be treated in order to make it more palatable and non-injurious. Boiling or soaking the grain before use has no especial advantage, except in the case of very weak or very young sheep. The following reports show methods adopted with success :—

Southern Plains.—Bales of straw were placed in an iron tank, filling the same with molasses and water and leaving twenty-four hours. The bales were then lifted with a derrick and allowed to drain. They were then taken to the paddocks and left for the sheep to tear to pieces.

New England.—With the aid of a suitable steaming plant much roughage which would otherwise waste can be made into good and digestible stock food. I have seen in past droughts rough, stalky, and sometimes musty, lucerne hay, straw, lucerne straw, hard stalky stuff after the seed has been threshed from it, the rakings up from the haystack and sheds, chaffed roughly and put through the steamer, allowing about thirty minutes to cook, turn out palatable and good stock food. Salt and molasses may be added when necessary. Breeding stock did particularly well on it.

Northern Tablelands.—Ewes would not rear the lambs. Took 200 lambs, from six to eight weeks old, and fed them on one kerosene tin of boiled corn and two kerosene tins of bran, with a loss of 5 per cent.

Southern Border.—One stack of hay was not fresh, the hay being dry. We damped this with brine and fed a lot of four-tooth wethers. Results were satisfactory.

Northern Plains.—Maize germinated before feeding gave the best results.

Cost.

No estimate of the cost of feeding can be submitted, as it depended largely on the local conditions and cost of fodder, but the following reports (taken from the letters received from sheepowners in the districts mentioned. each paragraph being an extract from a separate letter) are, nevertheless, o value :—

Western Plains.—One man is capable of providing scrub for 1,000 to 1,500 sheep daily. The cost of feeding by scrub cutting is estimated at 1½d. per head for sheep for a period of six months.

Northern Tablelands.—Sheep fed on wheat and scrub. Wheat trailed from spring cart. Not satisfac.ory as regards ewes. Low-grade wheat bought at 10s. and 11s. a bag. Cost of feeding 14s. per sheep, including labour, per year.

Fed wheat and scrub. About 4 oz. wheat per sheep per day. Cost of feeding, without labour, was 4s. 1½d. per sheep per year.

New England.—Lucerne hay, maize and bran fed twice a week. Two men with two carts fed 6,000 sheep for seventeen weeks, three teams carting from the station 12 miles—cost, £2 per day.

One thousand sheep (lambing ewes) fed four weeks. Used 100 bags of maize at daily cost of £5, including labour.

Hay, £5 ton; 1½ lb. per day per sheep, 5⅝d. per week. Maize, 4s. 8d. bushel; ½ lb. per day per sheep, 3½d. per week. Labour putting out feed, 1d. per week. Total cost per sheep, 10⅛d. per week.

Central Northern.—Cost of pitting ensilage of trefoil, crowfoot, and variegated thistle, 11s. per ton. Two men with cart and two horses can feed 3,000 sheep per day. Two hundred and fifty tons cut off less than 20 acres.

Central Western.—Pumpkins when first fed were 30s. a ton. They rapidly rose to 90s., at which price they were prohibitive.

Green fodder fed to sheep was green lucerne, Sudan grass, and barley grown under irrigation, at cost of 2d. per head per day.

Half a pound grain and ½ lb. hay per sheep per day. Cost £8 per 1,000 per day.

Quarter to ½ lb. corn at 10s. 6d. bushel; ½ lb. hay at £14 ton (landed). Cost of 8d. per head per week for dry sheep, and 10½d. per week for ewes in lamb.

Over-wintering of Spotted Wilt of Tomatoes

Tomato plants infested with the spotted wilt disease have been under observation in a suburban garden throughout the winter, to test whether or not the disease winters in the old plants. One old vine, still alive, is at present (11th July) showing the typical symptoms of the wilt—the bronzed appearance of the leaves and young shoots. As some growers have already commenced to plant out early seedlings, the possibility of them being infected from old vines is apparent. While the exact method of transmission of the disease from plant to plant is unknown, it would be wise for growers to destroy all old vines by burning before commencing to raise early seedlings.—C. O. Hamblin, Assistant Biologist.

When feeding sugar syrup to bees affected with dwindling, it is not necessary to remove the ordinary stores from the hive, for when the bees remove the syrup from the feeding combs it is placed by them in a position convenient for their immediate use. It will therefore be consumed early, and in preference to the ordinary sealed stores.—W. A. Goodacre, Senior Apiary Inspector.

Co-operative Factory Managers and Secretaries' Conference.

Winter Butter Show, 1921.

L. T. MacINNES, Dairy Expert.

The butter exhibited in the various classes customarily competed for at this show was, if anything, of somewhat better all-round quality than usual. Scores of 95 and 96 points were reached in some instances with, and in others without, the assistance given for improving flavour by the addition and use of a starter.

This year a new class was inaugurated—the "Robert Manning." In this competition, two boxes of butter of each competing brand were picked up on the wholesale distributing merchants' floors in Sydney in January. These were judged by the State Grader and placed in cold storage for five months, and then brought out, defrozen, staged on the benches at the winter show, and judged again. The brands scoring the highest aggregate number of points on the two judgings were awarded the leading places. This was an extremely severe test, far in excess of the requirements of local and export trade. For the latter, a storage of six weeks or two months at the most would suffice, because any butter manufactured here and exported to England would be disposed of there for consumption in ordinary years within two months of the date of manufacture. The test for keeping quality is severer than that of the "blue ribbon" or "continuous competition" of the Royal Agricultural Society. Of all the classes at the winter show the Manning was the most important, and the winning of it was most coveted by competitors. The quality of the butter entered showed that a large quantity would not stand a five months' storage test, although able to pass as of choicest grade for the requirements of the local trade for which it was made, that is, for consumption within at least ten days after being manufactured. To keep its quality for long periods, butter such as is needed for winter pools requires special attention in its manufacture, necessitating a stricter grading of cream with the exercise of the utmost care in its neutralisation and pasteurisation.

Month of Manufacture.

The month chosen to collect samples for judging was January, that month and February being the two worst months of the year from a butter manufacturer's point of view. To cap the usual difficulties experienced at this time, we had this year a rainfall above the average, and with it an abnormally humid heat. Attendant on these conditions was a mould epidemic.

Under-equipped Factories.

New South Wales dairy produce factories, in common with similar institutions in other parts of Australia, were allowed to become to a certain extent below the standard of efficiency on account of the difficulty, and in some cases the impossibility, of replenishing plant and financing the purchase of new equipment, renovating old premises or building new ones during the period of the war. The two years following were drought, and the small supplies of cream brought the finances of both companies and dairy-farmers into a worse state. Immediately following these unfavourable years came last year's bumper season. Factory managers had to treat supplies 37 per cent. above those of the previous year, and in a great majority of cases the manufacturing plant and engine-room power were insufficient to cope with the rush, the result being that employees had to work extra long hours, often finishing after dark. Temperatures for pasteurising, cooling and chilling cream, water and cold chambers, could not be controlled properly. Only those visiting factories working under such conditions can have any conception of the difficulties under which butter was manufactured during the height of the season 1920–21.

In connection with the "Robert Manning" competition the butter exhibited had also to suffer in very many cases from having to lie some considerable time on the wharves, railway trucks, and the agents' floors in Sydney at last summer's muggy temperatures, before being put into the freezing rooms.

The Result of Two Judgings.

There were fifty-four boxes examined. Taking the points scored for flavour, which is the determining factor in classifying a butter suitable for the local trade, there were, at the first examination last January,

31 scoring 43 points and over.
13 ,, 42 ,, ,,
9 ,, 40 and 41 points and over.
1 ,, under 40 (unpasteurised, fishy and oily).

On these figures, 81 per cent. out of the total scored 42 points or over under the extra strict grading to which show butters are subjected. The second examination, made five months later, demonstrated that 21 per cent. or twelve boxes had held their quality and were still 42 points and over, five out of the twelve grading 43 and over; thirty-one boxes scored 40 and 41 points, and eleven were of second grade. Of the whole exhibit, therefore, 80 per cent. was first grade and over. Taking into consideration the adverse circumstances under which this butter was made and kept before going into cold storage, and the very long period it was held in the cold rooms (at about 10 degrees to 15 degrees Fah.), New South Wales managers and butter-makers have come fairly well out of the trial. I think it can be safely said that under similar conditions, the result could not be surpassed or equalled in the other States, and I doubt very much if fifty-four boxes or kegs of best quality butter were haphazardly picked up in Denmark or New Zealand and

kept for a similar length of time at the same temperatures, whether the percentage to score first grade points and over for flavour, at the expiration of the period, would exceed the New South Wales 80 per cent.

Those twelve factories that had butter scoring 42 points and over for flavour at the second examination on 22nd June, are to be congratulated on the result, especially the winners of the competition—the Kyogle Co-operative Dairy Company (first), and the Binna Burra Co-operative Dairy Company and North Coast Co-operative Company's Uki branch, which divided second prize. It is worth noting that all three of these factories are located in the extreme North Coast, where climatic conditions are the worst for butter-making, and that while the winner used a holding-system pasteuriser, the runners-up used the flash-system. It is thus demonstrated that the causes of deterioration can be controlled in all factories in spite of heat and a wet, steamy climate. It shows that where the plant is equal to the demands made upon it, where cream grading, neutralisation and pasteurisation are efficiently done, and the work not slummed, butter can be made that will stand up against far harder trials than it might be reasonably expected to undergo, and yet emerge successfully.

Hard though the conditions are that govern this competition, they should not be modified, for to prove the possibility of manufacturing an article that can come through such a judgment, and be classified at the final as still choicest quality, is well worth while. Next year, instead of having 80 per cent. of the exhibits first grade and over after five months' storage, it is most desirable that there be 80 per cent. choicest, and 20 per cent. first grade. It should be regarded as a decided reflection, too, if there is any score under 43 points for flavour at the first grading. The goal is not unattainable, and if our managers and butter-makers have the necessary plant, and have not to rush their work through or work too long hours, they should be able to do it. They have the knowledge, the training, and the ability.

The Value of the Local Trade.

It is right that the principal class at the show should have been for butter that was submitted for sale for the local, State, or interstate trade, because this is by far the most important market we have, judging by the quantity disposed of, as compared with that exported overseas. In New South Wales during the past twelve months, local consumption averaged 20,000 to 22,000 boxes, or, say, 500 tons a week, equal to 26,000 tons for the year. This huge amount is increasing by over 1,000 tons a year, with the normal increase of 80,000 to 90 000 in population. Should a big stream of immigrants commence to pour in, consumption would the more quickly overtake production, unless the latter increased very much.

Since 1906 production has been increased, but it has not nearly kept pace with the State's increase in consumption. In 1906 (a normal season) we exported four boxes to every five boxes consumed locally; in 1917-18 (a good season) four boxes were exported to seven required for local consumption; in 19.9-20 (a drought year) it was four export to twenty-two local; while for the past year (an abnormally good season) the ratio was four export to eight local.

Over and above the large consumption within New South Wales, the interstate trade takes 1,000 to 1,500 boxes a week, or, say, 1,200 tons a year. The demand, both in interstate and local trade, is for choicest quality only, and as the consumption is so great, it is quite evident that very little choicest grade butter is left over for export to England, especially when the regular Eastern trade with choicest brands is deducted from the exportable surplus.

By the way in which the quantity of New South Wales butter required to fill Australian normal needs is increasing each year, it will only take another eight or ten years to overtake production in this State, and only the most inferior grades will be available for export.

GRADES of butter manufactured in New South Wales, showing regular increase in percentage of choicest.

Year.	Choicest.	First Grade.	Second Grade.	Total Production.
	per cent.	per cent.	per cent.	lb.
1916–17 ...	77·6	17·1	5·1	74,824,237
1917–18 ...	81	14	5	76,628,160
1918–19 ...	85·6	10·8	3·6	61 655 703
1919–20 ...	85·9	10·3	3·8	59,972,883
1920–21 ...	88	8	4	81,530,000*

*The last two months (May and June) estimated.

It has been stated that Australia, and New South Wales in particular, should increase the percentage of choicest butter in the quantity exported. This cannot be done unless local consumers are given the inferior butter to eat and a corresponding proportion of the best is added to that exported. Those who advocate this do not know, or if they do they wilfully shut their eyes to the fact that in Sydney and elsewhere in this State the people have been educated up to eating only the best butter, and any attempt to foist the lower qualities on them would be followed by disastrous effects on the merchant's trade who would be bold enough to try it. It is all very well to talk about sending better butter overseas to gain a reputation for high quality. When such butter is not available, it cannot be done. In New South Wales of late years there has been a marvellous improvement in quality—that improvement is still going on, but the increase in local demand is more rapid, so that each year there is a decline in the percentage of choicest and first grades sent to England. It is comparatively easy to increase the percentage of choicest from 40 to 70 per cent., but far harder to get from 80 to 90 per cent., and the nearer we get to *all* choicest, the more difficult the task becomes.

New South Wales, however, keeps going forward. Five years ago we had 76 per cent. choicest; last year it was 85 per cent., this year we have reached 88 per cent. It is doubtful if a higher standard than 90 per cent. choicest will be attained for many years to come.

INCREASING quantity of butter needed for local consumption and corresponding decrease in choicest exported.

Year.	Butter for Local and Interstate.	Total Choicest Manufactured.
	lb.	lb.
1916–17 (average season) ...	54,000,000	58,000,000
1917–18 (above average) ...	55,500,000	62,000,000
1918–19 } (below average)*	57,000,000	52,750,000
1919–20 }	58,750,000	51,500,000
1920–21 record, above average† ...	61,000,000	74,000,000

* In these years the local market required to be supplemented with first grade.
† On average production for last five years, and allowing 88 per cent. to be choicest grade, there would have been manufactured last year only 62,500,000 lb.

The average production of butter for the last five years has been approximately 71,000,000 lb., and the estimated consumption for the next year is 63,250,000 lb. Even if the proportion of choicest butter is as high as 90 per cent., there will still be only a surplus of slightly under three-quarters of a million pounds of that grade to export, unless local requirements are met in part with butter of an inferior quality. By 1923 we should be able to more than absorb locally the whole of the choicest grade, estimating it at 90 per cent. of the present average production.

There is only one way to increase our exportable surplus of choicest grade, and that is to increase production—increase it in greater proportion than the increase in population and consequent increase in local consumption. Strong efforts are being made by the State Dairy Branch and eminent public men to bring this about, especially by promoting and organising the testing for production of the dairy herds, their better feeding, and improvement in breeding to bring them up to a higher standard.

ELEPHANT GRASS AT NORTH RYDE.

MR. N. S. GUNTHER, North Ryde, has experimented with elephant grass for over two years, and provides some interesting data. He planted the clumps on high land, and states that "from observations it would appear that, without artificial watering, although it may not be equal to maize, nevertheless, on account of the long period it remains green—from early spring until late autumn—it deserves a place on the farm, particularly in the numerous odd corners where the plough or cultivator cannot reach." From a single plant eighteen months old, he obtained 124 lb. of green feed which he chaffed and fed to stock with satisfactory results. He states that by 28th May, although some of the stems were still green, a good 50 per cent had been lost in weight. He again chaffed and fed it to a Jersey cow with good results. The hay was particularly appreciated.—E. BREAKWELL, Agrostologist.

Co-operation for Farmers.

C. C. CRANE, B.A., Organising Inspector of the Agricultural Bureau.

Much has been written on this subject, but the object of the present paper is to set forth in a simple form some of the principles of co-operation in the hope that they may serve as a practical guide to rural communities when pioneering co-operative enterprises in their own districts. The principles on which the "Rochdale pioneer movement" was built, are the basis of all successful co-operation throughout the world, and may be briefly numerated as follows:—

1. Interest on shares not to exceed a given maximum.
2. Shares always remain at par, because interest is fixed at current rates.
3. Control of business to be democratic—one man one vote.
4. Voting to be done in person—not by proxy.
5. Selling price of goods to be at current market rates.
6. All sales for cash.
7. The margin between wholesale and retail rates, commonly called "profits," to be refunded periodically to purchasers in proportion to the amount purchased.

It is realised that co-operative manufacture and distribution are the real goals at which producers must aim, and this fact is evidenced by the growth in this State of two clearly-defined groups of co-operators, viz., producers and consumers. On the other hand, since all producers are consumers and less obviously *vice versa*, producers might with real advantage associate themselves with consumers' co-operative concerns. The establishment of co-operative stores may be advocated for the following reasons:—

1. Consumers' co-operation requires less organisation, less outlay of capital, and involves little or no risk.
2. It will show quick returns in hard cash, and furnish facts and figures which will serve as invaluable propaganda.
3. It will foster the community spirit, and indicate ways in which the co-operative store may become a co-operative movement.
4. An affiliation of local co-operative societies will pave the way for an agricultural co-operative wholesale society.
5. Such a co-operative wholesale society would provide the machinery for co-operative manufacture and distribution.
6. Co-operative credit will be developed.

Thus it is claimed that the co-operative store is but the first rung in the ladder of the co-operative movement. A wholesale society built on an affiliation of local societies would be infinitely more appealing and democratic than a similar organisation that was organised from the top.

Preliminary Considerations.

Co-operation has been hampered by (*a*) the lack of co-operative legislation, (*b*) the existence of many concerns which are co-operative only in name, and (*c*) lack of co-operative propaganda and education.

Since many people are suspicious of the movement, having previously participated in premature and ill-considered ventures that have ended in financial loss, the formation of a simple local undertaking involving the smallest possible risk, and yet showing practical results in economy, may be advocated as a means of arousing co-operative interest first and enthusiasm as a natural consequence. The results should be intelligently used as material for propaganda for further developments, which will involve the outlay of capital and will call for the unswerving and loyal support of the members. No beginning can be too small, provided that (*a*) practical results are achieved, and (*b*) that such results are used as propaganda. Co-operation is a movement which should develop from the beginning in every case, so that each and every member will realise the economic and community value of co-operative methods. It is not just a "cheap store" movement. It is a movement that embodies a big ideal of community service and that therefore calls for more than nominal support. In every sense of the word it is a "get-together" or "community-business," and its beginnings will be on a scale commensurate with the "get-together" strength of the few who set the movement working in any district.

Pool-buying of Special Requirements.

A co-operative undertaking involving little risk, requiring little organisation and yet capable of showing big returns, is the co-operative for pool-buying of special requirements. By buying in bulk in advance of actual requirements, on the best market and for cash, and by taking advantage of wholesale prices, by reducing the number of middlemen between the wholesaler and the consumer, and by the reduced railway freights on big consignments, several farmers in a district could with advantage pool their orders for certain kinds of requirements, and effect substantial economies. One man should act as secretary, obtain quotations from as many sources as possible, receive orders and cash from those co-operating, despatch the orders, and arrange to receive the goods. Mutual arrangements would then have to be made for dividing the consignments into small parcels ready for distribution. This necessarily involves a good deal of trouble for one or more of the members, but the experiment is worth trying, for a few trials will prove the economy of the effort, and will indicate that it would be economical to arrange to pay someone to do the parcelling and to give delivery. Of course this implies a middleman, but co-operation does not aim at eliminating middlemen—it aims at (*a*) substituting a co-operative employee for the speculative middleman, and (*b*) reducing the number of middlemen.

Examples of successful work of this nature are not wanting, and the following particulars supplied by the secretary of the Milbrulong Agricultural Bureau Trading Society regarding the methods of that body, are worth the study of such communities as have not yet made the experiment.

The Milbrulong Agricultural Bureau Trading Society.

The Society commenced operations in March, 1920, with the following objects :—

1. To obtain farmers' requirements at the lowest possible cost.
2. To bulk purchases in order to obtain the lowest railway freights.
3. To eliminate middlemen and agents as far as possible.
4. To bring farmers into touch with the markets for farm produce and farm requirements.

The first move was a special meeting at which the venture was discussed, a committee of seven was appointed to control the business, and the secretary was instructed to write to various wholesale houses for quotations for farm requirements. A date was then fixed for the first meeting, at which orders would be taken.

At the "order meeting" the quotations received were read by the secretary, the members present making a note of their requirements. Each then signed his list and handed it to the secretary, who then made up the total orders into one large order and despatched it to the firm quoting most reasonably.

To enable cash to be paid for the goods upon receipt of invoice all members signed a guarantee for an advance of £1,000 from the bank. This proved very successful, as during the first six months of operations the interest on the amounts borrowed amounted to only 14s. 1d., while the discounts received in consequence of paying cash within the three, seven, or thirty days, as the case might be, amounted to £12 10s. 4d.

To the cash price and freights on the goods, a handling charge of 2½ per cent. was added, of which 1½ per cent. was paid to a man who was appointed to take delivery of the goods on arrival, and to distribute them to members as ordered. The remaining 1 per cent. was retained to cover banking and secretarial expenses. After six months of operations it was evident that the 2½ per cent. was sufficient to cover all expenses. All members have to pay cash for goods on delivery. This is necessary to safeguard the venture from bad debts, &c. One rule provides that only *bonâ fide* farmers can be appointed to the committee in order that agents may be prevented from obtaining control in the society.

During the first six months the following lines were handled successfully :—Oils, binder twine, seaming twine, cornsacks, wire, benzine, kerosene, groceries, and other smaller farm requirements.

On an average about 20 per cent. was saved over local prices—in some cases as much as 60 per cent. Some farmers bought up to £150 worth of goods during the first six months of the society's operations, and the saving to them was substantial.

The turnover for the first six months, during which three "order meetings" were held, was £1,587 16s. 6d.; and for the first twelve months, £3,016 16s. 2d. Latterly it has been considered unfair to receive such services as the secretary renders without reward, and it was decided to

increase the charge of 2½ per cent. to 5 per cent., and to allot it as follows: secretary, 1½ per cent.; distributing agent. 1½ per cent.; bank charges, 2 per cent. A feature which has proved of the greatest convenience and economy has been the accommodation afforded by the bank at Lockhart.

The movement has met with such marked success that people have come fifteen to twenty miles to place an order for goods. The members recently decided to commence a farmers' co-operative store, and promises of 3,000 shares of £1 each were received, but owing to the financial difficulties attendant upon the wool position, and the deferred payments for wheat, it has been decided not to proceed at this stage with the establishment of a co-operative store, the members preferring to register as a co operative society and to build a shed to facilitate the continuance of the present system.

The following are the rules and regulations under which this trading society acts:—

RULES OF MILBRULONG AGRICULTURAL BUREAU TRADING SOCIETY.

1. That the Milbrulong branch of the Agricultural Bureau form a wholesale, retail, buying and selling association, to be comprised of all financial members of the Bureau.

2. That seven directors be appointed with the president and secretary *ex-officio*. The directors to be appointed at the annual meeting, ten days' notice of such meeting to be given by advertisement in the local papers, or by circular.

3. That the directors be empowered to make such banking and financial arrangements as may be necessary to carry out the objects of the Milbrulong Agricultural Bureau Trading Society.

4. That the directors, together with all members, be guarantors for all liabilities and contracts made and entered into by the directors, the directors being empowered to relieve any member of being a guarantor.

5. That the directors be empowered to acquire any business, agency, or agencies to carry out the objects of the Bureau Trading Society. Such acquisitions to be confirmed by a two-thirds majority of the members at a meeting called for the purpose.

6. That no person be eligible to hold a position on the executive who holds any interest in any buying or selling business or agency outside his own business as a primary producer.

7. That a majority of directors present will form a quorum.

8. That the directors be empowered to obtain such legal advice as may be necessary to carry out the objects of the society.

9. That all business and trading be carried out on a strictly cash basis.

10. That all orders for goods be paid for on delivery, with such addition to the cost price as will be necessary to cover freight, cartage, storage, and handling charges, as determined by the directors.

11. That the secretary keep a copy of all outward correspondence, and present all inward correspondence to the directors at their meetings.

12. That the secretary shall prepare and submit a financial statement at each quarterly meeting of members to be summoned by the directors.

13. That a special meeting of members shall be called to receive orders at such time as the directors think fit.

14. That all orders, when a shortage occurs, be distributed on a *pro rata* basis.

15. That (*a*) the president and secretary have power to sign all cheques, bills of exchange, and promissory notes on behalf of the association; (*b*) the secretary to have the power to endorse all cheques, bills of exchange, and promissory notes.

16. That any alteration, deletion, or addition to these rules be made by a simple majority of members present at a meeting for such purpose.

These are the actual working rules of the society, which is conducted as an unregistered co-operative concern. The practical results of this society are indicated by the savings to the members, estimated by the directors of the concern, in the purchase of the following lines :—

Sheep salt, 15s. per ton ; bluestone, 3d. per lb. ; jam, 5d per tin ; sugar, ½d. per lb. ; black wire, 5s. per cwt. ; barbed wire (galvanised), 15s per cwt. ; barbed wire (black), 25s. per cwt. ; molasses, 8s. per cask ; kerosene, 2s. per case ; benzine, 2s. 6d. per case ; Epsom salts, 7s. 6d. per cwt. ; plough discs, 10s each ; one-way discs, 7s 6d. each ; steel shares, 27s. per doz. ; machinery oil, 1s per gallon ; tools, chains, &c., 20 per cent. ; bran bags, 1s. a doz. ; flour, 3s. a bag ; waterbags and pitchforks, 25 per cent.

Undoubtedly bulk buying of requirements has much to recommend it, for it offers real facilities for economy, and at the same time does much to foster the "get-together" movement so urgently required in farming communities. It affords excellent material for propaganda, but while making it possible for goods to be obtained more cheaply than would be the case were they obtained through an established co-operative store, the method suffers from the following disadvantages :—

1. It concentrates much work and worry upon one or two of the members.
2. It enables the many to effect real economies at the expense in time and thought of the few.
3. It makes no provision for laying in a stock of commodities, and purchasers are restricted to leading lines.
4. It does not afford the machinery for linking up readily with similar bodies with a view to forming a co-operative wholesale society.
5. It necessitates dealing with proprietary wholesalers or agents, thus limiting co-operative activity.
6. It does not enable the members to purchase land or erect buildings, as, not being registered, the society has no legal status.
7. Not being registered, no legal protection is afforded its members against delinquent employees.

As is indicated in this description of the Milbrulong activities, the stage has been reached when it is deemed advisable to take the next logical step in the co-operative movement, namely, the registration of the society. There are two courses open to such a progressive community : the one to erect and stock a co-operative store, the other to buy out a local store. To follow either course requires registration as a company. To buy out the local store has much to recommend it, in that it removes the first source of opposition, but it may be too big an undertaking for a young society. Still, with the valuable experience and facts at the disposal of the society, the co-operative strength of the society should be sufficient. It is worth noting at this stage that many of the most successful rural co-operative concerns in Victoria have bought out a local storekeeper, thus starting off with a going concern. Against such a course is the consideration that a "good-will," of no real value to co-operation, has to be paid for.

A Registered Co-operative Society.

The following description of the co-operative concern at Miranda is furnished by the secretary. It describes a society which registered as a co-operative society in the first place, and it is therefore a useful demonstration of a different stage in the co-operative movement.

The Miranda Agricultural Bureau, Limited, was established in 1917 for the purpose of acquiring a meeting place for the branch, and to obtain supplies for poultry farmers and others. It is a trading company, run in conjunction with the local branch of the Agricultural Bureau. It was started in a humble way, without any great pretensions, the officers and directors carrying out the work free of expense, thus conserving everything for the benefit of the company. A building that had been used as a church was purchased; shares at £1 each being issued either fully paid up, or paid up at 2s. 6d. per month. A truck of wheat was purchased from the wheat pool as a start, and a carter was engaged by contract to deliver the grain to the members.

This initial venture proved to be a great success. By adding 5 per cent. to the price of goods, the selling price covered all expenses incurred, and left a surplus to help strengthen the society's finances. Some members who had only taken up one share, and had bought seven bags of wheat, stated at the meeting following the preliminary purchase that they had saved their £1 already. Operations soon had to be extended, as bran and pollard, kerosene, and other articles were required. The system worked well for a start, but it was soon found that a stock-in-hand was required, and an available store was rented, and a storeman engaged, as the business was becoming too extensive for voluntary labour. From this point the growth of the company was rapid, and at the end of the first year a dividend was paid on shares of 7½ per cent., and a bonus of 1s. in the £ on purchases, thus putting the society on a good footing.

The great success of this company has been in being able to supply bran and pollard in times of scarcity, for in trying to cater for the poultry farmer the directors looked ahead for supplies, and thus saved the local poultry industry. The company now supplies all the needs of poultry farmers and orchardists, including manure, lime, sprays, flour, coal, and coke. Anything else required is obtained for them.

One great result has been the reduction of prices in the district for miles around; in fact, the local profiteer has been abolished. The turnover is now nearly £3,000 per month. The capital amounts to £1,300, of which amount over £500 is accrued bonuses, so that members have only paid in £800, though holding £1,300 worth of scrip carrying 7½ per cent. interest.

Adjoining the railway siding a store has lately been built at a cost of £350, the money being allocated from last year's profits. The company now owns real estate to the value of over £800, all paid for, and instead of depending upon voluntary labour, a managing director and a storeman are employed.

This shows what can be done by co-operation on right lines, and by good management. It has not been accomplished without opposition, but the directors have gone on steadily, giving everyone a fair deal, pursuing a straight policy, and to-day the concern is a strong one and no one can trouble it.

The Two Methods Compared.

The two examples of (*a*) a bulk-buying concern operating without registration and without the formation of a company, and (*b*) a registered co-operative society, as typical, successful farmers' concerns, should prove useful models for other communities.

Just as Milbrulong has realised the advantages of taking a step forward in the movement, so has Miranda realised that it should now take its next step and affiliate with other organisations of a similar nature to secure the advantages of co-operative wholesale buying. To a certain degree this is impossible at the present juncture, because there is no co-operative agricultural wholesale society in the State. Certainly it could affiliate with the New South Wales Co-operative Wholesale Society, but this affiliation would only assist it in certain lines, inasmuch as that society is the daughter of some thirty or forty co-operative stores in more densely populated areas, and it naturally caters especially for the requirements of the affiliated stores. Still, it is obvious that with the affiliation of numerous societies similar to those of Miranda and Milbrulong, the existing wholesale society could with mutual advantage assume the functions of a co-operative agricultural wholesale society, and farming communities as consumers could without any sacrifices easily and profitably affiliate. In fact, such a course would even be preferable to the establishment of a separate co-operative wholesale society, and the existing society is actually anxious for the affiliation of co-operative institutions in rural communities.

(*To be continued.*)

Medicinal and Culinary Herbs.

The production of medicinal and culinary herbs in a commercial scale is only recommended as a side line, and not as a sole means of livelihood. In fact, it would be extremely hazardous for one to attempt as an industry, unless he was an expert cultivator and was familiar with the state of the market, and with the preparation of the goods for market. Supplies from oversea countries of cheaper production are now becoming normal, and the growth of lavender, grasses, and various mints for their essential oils is a fickle industry, by reason of the fact that most of the oils and perfumery produced naturally are now manufactured synthetically.—E. N. Ward, Superintendeent of Gardens.

Combined Sprays.

In making combination sprays, it is essential to see that the whole quantity of liquid is correct. If 100 gallons of lead arsenate and nicotine solution are being made, the method would be somewhat as follows:—If 1 lb. arsenate of lead is being used to 25 gallons of water, it would be necessary, of course, to use 4 lb. lead arsenate, and if the concentrated nicotine solution was being included at the rate of 1 to 800 by volume (1 pint to 100 gallons water), the better plan would be to mix the lead arsenate in, say, 95 gallons of water. One pint of the nicotine concentrate should be mixed with 4 gallons 7 pints of water, and added to the 95 gallons of lead arsenate.—W. J. Allen.

Producing Lucerne Hay under Irrigation Conditions.

Methods and Experiences at Yanco Experiment Farm.

[Continued from page 471.]

F. G. CHOMLEY, Manager, and F. CHAFFEY, Farm Foreman.

The Irrigation of Lucerne.

The lucerne being thus established, the method of irrigation during the rest of the life of the stand may engage attention.

The first application of water is given as soon as the first crop of hay is off the land, in order to stimulate an early growth, and further irrigations follow as the season requires. Generally speaking, one irrigation for each cut is sufficient in the early part of the season, but as the weather gets hotter more are necessary, averaging two per cutting, and the exact time when these are made must entirely depend on the season.

The practice at the farm is to irrigate a week before cutting. A second watering is given as soon as the hay has been taken off; this makes two waterings per cutting, which is usually sufficient. Should the weather be excessively dry and hot an extra watering about fourteen days after cutting may be found necessary. The object aimed at is to keep sufficient moisture in the soil to produce maximum results. Other periods of watering have been tried, but the above practice has been found to give the best results. It is not advisable to wait until the lucerne shows signs of distress; this must be anticipated as much as possible.

As already indicated, a big body of water is never turned on the lucerne at one time. The head ditch is filled and then a gap is opened in the bank about half-way between the check banks, allowing enough water to escape to spread from bank to bank, just covering the surface and moving forward very slowly. The slow advance of the water robs irrigation of much of its attractiveness, no doubt, but a rush of water is never satisfactory, for it wets the surface without saturating the subsoil. It should take from six to eight hours for the water to reach the lower end of the block 6 chains away, by which time the water can be shut off at the upper end. If the land has been well graded, and the water properly applied, there should be very little surplus water to fall into the drain.

The above method is that adopted on a heavy soil, of course; on lighter soils, which absorb water more rapidly, the flow can be a little faster. The land on the farm will absorb 2½ to 3 inches of water, whereas light soils with such a slow flow would take up too much. If too much water is applied the

effect is a consolidation of the surface that deprives the roots of the lucerne of air, and hinders bacterial activity in the soil.

It is imperative that facilities be provided for thorough surface drainage. Water lying on lucerne for three hours on a hot day will scald the plants and do irreparable damage to the stand. Special attention is necessary in the evening in ceasing operations to ensure no flooding. This is achieved by starting more checks, which will take the whole night to run through.

A close watch must be kept on the growth, and so soon as there is any appearance that water is required it should be applied. Farmers are inclined to consider any special irrigation as either too much work or too much expense, but if lucerne-growing is to be a success any reluctance on either of those scores or any imaginary grievance about the price of the water must be put aside. It is the commercial result that has to be kept in view,

Flooding a Lucerne Block.
Slow soakage is the method sanctioned by experience at Yanco Experiment Farm.

and water must be applied at intervals required by the crop—not at the convenience of the grower. If the water is left too late the growth seems to harden off, and can never be brought back to its original freshness; indeed, watering after the top growth has hardened off only promotes the development of the next growth from the ground, and does little for the standing crop.

The secret of success with lucerne is to watch it at all stages, to keep it growing as you would a soft green vegetable for the table, and to cut it as soon as it is ready.

The "hardening off" referred to is difficult to describe in any other term, but the observant farmer will quickly detect it. The best treatment is to turn in the water immediately that symptom appears; if done quickly enough the effect may be to save the crop and bring it back to its original

freshness. If it is impossible to water at once it will be better to proceed to harvest the crop for hay in the ordinary way, and to take greater care thereafter not to allow the crop to go so long without water. When the crop has lost its fresh, green colour and has acquired a bluish appearance, it is too late to restore it to the sappy condition that makes the best hay.

When to Cut Lucerne for Hay.

The right stage to cut the crop has always been a matter of discussion among lucerne growers. On the farm we do not watch the bloom, though many authorities advise cutting when one-tenth of the heads are in flower. We prefer to watch the bottom of the growth. So soon as the lower leaves have turned a lightish colour, and the new shoots begin to appear on the crown, the crop is ready to be cut. The operation must not be delayed, for the leaves, in which much of the nutrition and palatability of the hay are stored, will then fall off, and the hay will be harsh and stalky. The dropping of these leaves is the provision that nature makes for the admission

Lucerne Ready for the Mower.

Six to seven cuts per season, each yielding one ton of hay per acre, are obtained on the best land at Yanco Experiment Farm.

of light and air to the young shoots that are appearing on the crown, so that nature, as well as commercial interest, indicates to the farmer when he should cut.

The early cuttings of each season take about six weeks to grow, but as midsummer comes on the lucerne grows quicker and quicker, and in January, February, and March, and even in April, only four weeks are required to mature a cut. As the weather cools off, the growth becomes slower again, and the last cut usually requires six weeks. On this basis is is possible to get six or seven cuts in a year, and, owing to the regular water that irrigation ensures, there is more certainty of the seven cuts in a dry hot season than in a wet one. As a matter of fact, the competent farmer has his fortune in his own hands under irrigation in a manner that is impossible under any other conditions; not only is this true in respect of

quantity, but it applies to quality also. However sound his methods may be, the Tamworth or Hunter River grower of lucerne hay stands no small risk of two or three crops of indifferent quality per season, but crediting the Yanco grower with every likely mischance he should produce six crops of good quality hay every season, and perhaps a partially spoiled one to boot.

Modern Machinery for Haymaking and Marketing.

With the aid of thoroughly up-to-date machinery, lucerne hay making on this farm has become a regular routine. The financial outlay has perhaps been greater than a small grower would care to contemplate, but it has been no greater than might reasonably be undertaken by any grower or group of growers who could see their way to handling, say, 100 acres under lucerne. It may even be hazarded that the time is not so distant when the

The Mower in a Good Crop.

whole operation of cutting, curing, carting, and baling, will be undertaken on contract by the owner of a plant that involves a good deal less money than the threshing mill and engine so common in our cooler grain districts.

Briefly, the hay is cut with an ordinary mower, drawn into windrows with a rotary rake, picked up by a hay loader, carted direct to a derrick press, baled and wired without the formality of being stacked, and drawn at once to the railway. From waving lucerne in the paddock to fragrant hay on the truck something less than three days is involved in the height of the season, and a team of eight men, including the foreman, keep pace with the growth of 120 acres.

But we retrace our steps to give the process in more detail.

The crop being ready in accordance with the indications described above, it is cut with the mower, and allowed to lie in the swath until it has wilted nicely. The mower should be set to cut as low as possible without the

blades being damaged, the object being twofold, namely, to get the maximum of hay, and to force the new growth from the crown proper, rather than from the bottom nodes of the cut stalks. No swath board is used; and this is important, as a swath board gathers the lucerne into a row which does not dry evenly. In the early part of the season drying in the swath may take three days, but in the height of midsummer a few hours is all that is required, the morning cut being often ready to be drawn into windrows in the afternoon. In the cool weather and damp nights of the spring and autumn the windrow may require to be turned once, but in the summer the handling must be the minimum or the leaves will be lost, and with them much of the quality and attractiveness of the hay.

The rotary rake does its work expeditiously and well, leaving the windrows loose and light, so that the air passes freely through the stuff, drying it as rapidly as if it were in the best-made cock.

The time of carting is influenced by the same considerations. The condition of the hay is the true indication as to when it is ready to be picked up; it should not be left to become dry or brittle, and it should be tough in the hand though without sap when twisted. It is one of the advantages of having irrigated shortly before cutting, that the ground is not devoid of moisture, and should the hay become a little too brittle for safe carting in the afternoon it can be left on the ground, and will take up moisture again at night; in that condition it is less likely to drop its leaves, and can often be carted quite safely in the morning.

From the windrow the mechanical loader lifts the hay direct on to the waggon in an unbroken swath. No second raking, no laborious cocking, no heavy forking to the top of the load—only that steady ascending stream of green stuff picked up by two sets of small rotating forks, and carried by a simple elevator to the top of the load. Three men make up the loading gang, one being in charge of the horses and the other two stacking the hay on the waggon.

The crop being off the ground, the next growth comes away readily, and (assisted by irrigation as required) in the height of summer is ready to cut in four weeks. Let it be said that irrigation in view of each cut necessarily depends on the weather, for if rain falls in sufficient quantities it may not be necessary to turn the water on during growth, but the least appearance of the "hardening" already described should be the signal that a watering is necessary.

On page 467 last month the board of the road-grader was described as 19 feet long. This should have been 10 feet.

(*To be continued*).

Correction.—The omission of a title, "Hay Yields," at the top of page 406 in the June issue of this *Gazette*, made the article read as though no grain yields were taken. As the previous page showed, the grain yields were recorded. It was the hay yields that were not taken.

The Rotary Hay Rake.

The Rotary Hay Rake at Work.

This implement draws the hay into windrows in which it dries and cures as well as in the best made hay-cock.

The Hay Loader in the Field.

The lucerne hay is lifted from the windrow and carried in a steady stream up the elevator as the waggon moves forward.

Hope of Wollongbar (280, Vol. II, A.G.H.B.), by Hayes' Fido (imp. 24 A.G.H.B.), ex Faith (48 A.G.H.B.).
Official Test—13,417 lb. milk, 800·017 lb. butter-fat, in 365 days.

High Milk and Butter-fat Production.

The Pure-bred Guernsey Cow—Hope of Wollongbar.

L. T. MacINNES, Dairy Expert.

Another meritorious performance has been completed under the official tests carried out by the Department of Agriculture—this time by the Guernsey cow, Hope of Wollongbar, bred and owned by the Department of Agriculture, New South Wales, and milked on the Wollongbar Experiment Farm, Lismore, where the Department's Guernsey herd is located.

Since the United Pure Bred Dairy Cattle Breeders' Association of New South Wales, of which the Department is a member, commenced submitting stud dams for official test, it has been the means of bringing before the public in all parts of the world the splendid capabilities of New South Wales dairy stock of all breeds. The high yields of milk and butter-fat given by large numbers of our stud stock are attracting wide attention, not only in Australia, but in New Zealand, South Africa, North America, and Great Britain. A few years ago a yield of over 400 lb. butter-fat was considered worthy of comment, now such records are common, and it requires something well over 500 lb. to attract notice, and for a special paragraph it needs to be something over 600 lb. butter-fat.

The great improvement shown has been brought about by better breeding. The stud masters in charge of herds under official test are using sires that are of proved high production strain, irrespective to a great extent of their merits from a show-ring point of view; as long as they have also a strong constitution and physical development on the lines needed to make up any deficiency in that way in the strain with which they are being mated.

Another most important factor bearing on improved yields is the better methods of feeding that are being adopted. Formerly it was too often apparent that cows were being subjected to a production trial without being supplied with sufficient food to sustain themselves. But once breeders get interested in their production records, they soon set about rectifying this. They grow fodder crops to aid the pastures, and study the individual constitutions of their cows and ration them accordingly, giving concentrated foods, such as maize, oats, linseed meals, oil cake, bran, etc., in the proportions suitable for each case. As soon as the fluctuations in the cows' production can be studied by means of the test sheet, it does not take long to discover that, while a given ration may induce an increase in yield in one cow, it may not have the same effect on its mate, and something different has to be tried. Undoubtedly there are numbers of pure-bred cows in the State that would, if properly fed, give much higher yields than they do, without detriment to their health and to the benefit of their owners' bank accounts. The idea that it is unprofitable to hand-feed a cow in addition to what she picks up in the fields, is untenable as a general statement. Some, certainly, as dairy animals

are not worth feeding (some not even by pasturing), but in the great majority of cases the increased yields very much more than pay for the added cost of the extra fodder. Unfortunately, most of our stud cows are not given a chance to prove themselves ; their owners, either through fear, ignorance or lack of progressiveness, take no steps to put them under test, in order to clear their reputations.

The Record of Hope of Wollongbar (280, Vol. II, A.G.H.B.)

The present is not the only test on record as regards Hope of Wollongbar. She has three other records for lactation periods of 273 days each to her credit, but the last, the fourth, was the only one conducted under really favourable feeding conditions. The various yields given during the last four years exemplify the beneficial results of feeding, and also the loss entailed in not providing full and plenty for a cow at all times, including the months prior to freshening. To do justice to herself an animal should not be in poor condition when she calves. On the last trial Hope of Wollongbar's average test was increased, showing that during previous lactation periods she had not been producing to her full capacity, either as to quantity of milk or of fat content. Ill feed or illtreat a cow, and the result is shown in the reduced test, as well as in a lessened flow of milk. It remains to be seen if Hope has yet reached her maximum. She was not under a proper ration during the last test, and if that were given next time she might exceed her present average test, high though it is. No cow can exceed her maximum, but to ascertain what is her maximum requires scientific feeding, and kind, careful treatment. In striving for the maximum, however, the constitution should not be overtaxed, nor the capacity for breeding endangered.

HOPE OF WOLLONGBAR'S Milk and Butter-fat Records—273 days.

Test.	Age.	Commenced Test.	Milk Yield.	Butter-fat.	Average Test.	Commercial Butter.
	yrs. mths.		lb.	lb.	per cent.	lb.
1st ...	2 9 ...	2 October, 1916 ...	3,790	200·000	5·3	241
2nd ...	4 0 ...	3 January, 1918 ...	5,799	324·381	5·6	378
3rd ...	5 4 ...	1 June, 1919 ...	8,311½	461·895	5·6	556
4th ...	6 6 ...	5 July, 1920 ...	11,214	655·017	5·8	789

The last test was continued to cover 365 days, at the end of which time the record was 13,417 lb. milk, 800·017 lb. butter-fat, average test 6·0 per cent., which, upon the standard adopted by the Breeders' Association of 83 lb. of butter-fat to each 100 lb. of commercial butter, means equal to 963·875 lb. commercial butter. The records were calculated under Scale B (regulations governing the official herd-testing scheme), which provides :—"In the cases of cows tested fifteen to twenty-four days, both inclusive, after calving, that the actual tests made at the time of the tester's visit if not abnormal shall be used without averaging with either the preceding or succeeding tests as the base of calculation of each sub-period of the test. The whole period to be covered by nine or twelve tests as required to complete 273 or 365 days respectively."

Hope of Wollongbar began her test on 5th July, 1920, and the last or twelfth test was made on 30th May, 1921. She calved on 19th June, 1920, and the period of the test commenced four clear days afterwards, in accordance with the Association's rules. The last test was therefore made on the 341st day after the test began, or fourteen days prior to the end of the testing period (365 days). She was dried off on the 14th June. On her final test she gave in the morning 9 lb. milk testing 6·1 per cent., and in the evening 7 lb. milk testing 6·8 per cent.—equal to 16 lb. milk, 1·025 lb. butter-fat for the twenty-four hours, or 496 lb. milk, 31·775 lb. butter for the twelfth sub-period of thirty-one days.

On the first test she gave 43 lb. milk, 2·639 lb. fat; the best yield of the whole period was given in December on the sixth test, when she produced 43½ lb. milk, 2·748 lb. fat. She was milked twice daily and received no special attention. She was rugged in the winter and at all times lived in the open, not being housed at night. She was served on 5th November, 1920, shortly after the test commenced, and carried a calf for about seven and a-half months of the lactation period.

Hope of Wollongbar's Pedigree.

The following are the particulars of this cow's breeding:—

Calved 10th January, 1914.
Bred by and the property of New South Wales Department of Agriculture.
Sire, Hayes' Fido (imp., 24 A.G.H.B.).
Dam, Faith (48 A.G.H.B.).
Sire of dam, Prince Souvia by Vivid's Prince by Rose Prince (imp.).
Second dam, Miss Clatford of Wollongbar (124) (imp. in dam).
Sire of second dam, Clatford Hope II, (28) (1814 E.G.H.B.).
Third dam, Clatford Hopeful (27) (imp. 6811, E.G.H.B.).
Sire of third dam, His Majesty III, (1387 P.S.R.G.A.S.).
Fourth dam, Lady Tucker (5733 P.S.R.G.A.S.) by Flying Fish (303 F.S.R.G.A.S.).

Although known to come of a producing family, the records are not available to the same extent as in the case of the Milking Shorthorn cow Melba XV, described in June, but various relatives have been tested officially in this State under the United Breeders' Association's scheme, and these give some indication of the hereditary production running in the strain.

Her dam Faith, at 6 years old, gave 3,894 lb. milk, 246 lb. butter, in 213 days. This record was put up under unusual circumstances, when Faith was on her fifth calf. She came in after the birth of her first calf with her udder injured, and she lost two quarters permanently. She was not at first milked by hand, but until a start was made to milk her for the above record she was used solely to suckle calves. The record, therefore, demonstrates what she was capable of producing with two teats only.

Vivid, the g.g.g. dam of Hope, gave 4,679 lb. milk, 220 lb. fat, in 189 days.

Of the dam of Hayes' Fido (Hope's sire), there is no record, but Hayes' Olive (imp.), the dam of Hayes' Fido's sire (Hayes' Coronation III) has several records entered to her name in the English Guernsey Herd Book, as winner of both milk and butter-fat tests at the London Dairy Show and

elsewhere. These records are of much less value than those showing production over lengthy periods, such as nine or twelve months, but they serve to indicate that there was a production trait in the strain. Hope is third in descent from Hayes' Olive.

Hope's Own Progeny.

Of her own progeny, two have been tested to date—her twin daughters Honour and Trust. Their records were put up off pastures alone.

	Age.	Milk. lb.	Butter-fat. lb.	Period.
Honour ...	3½ years	5,446½	305	273 days.
Trust ...	3½ ,,	5,763	277	273 ,,

Honour has commenced her third testing period, and promises to put up a record worthy of her dam. Trust is springing to her third calf.

Hope's son, Judge of Wollongbar, was exhibited in the yearling class at the Royal Agricultural Society's Show this year and won the blue ribbon.

The Wollongbar Guernsey Herd.

This herd, of which Hope of Wollongbar is a unit, is a very fine one, second to none of the breed in Australia. Not only has the Herdmaster of the Department, Mr. J. A. Robertson, built up the constitution and improved the type, but production, that most important character in dairying, has received special attention. As an example of what has been done from the standpoint of general appearance, it may be stated that the champion bull at the last Sydney Royal Show was Rose Chief of Wollongbar, and, as already stated, the first in yearling bulls also went to the same stud.

As regards production, many individual fine records have been made in addition to the one now under review, but the improvement that has taken place is best exemplified by the increase in the average production of the herd. In 1913 the average was 206 lb. of butter; for 1917-18 it was 278 lb.; for 1918-19 it was 332 lb.; for 1919-20 (a drought year) it was 375 lb.; and for the year ending 30th June, 1921, it reached 385 lb. The average number in the milking herd during the latter two years was about forty-five. This is a very fine average, and reflects great credit on the manager of the farm, Mr. A. H. Haywood, and his assistants, apart from the fine demonstration it gives of the soundness of the lines on which the stock are being bred by the Herdmaster.

Hope's Feed and Rations.

The following are the particulars of Hope of Wollongbar's feed during the test:—

Pastures.—Paspalum, also clover (October).

Rations.—July to September: A small quantity of ensilage and bran; October: about 10 lb. bran and chaff daily, also ensilage; November: 6 lb. bran, 6 lb. lucerne chaff, and 6 lb. oaten chaff daily; December: about 15 lb. lucerne chaff, bran, linseed meal, and wheaten chaff daily; January: about 20 lb. bran and chaff and chaffed green corn daily; February: about 15 lb. bran, lucerne, and oaten chaff daily; March: about 16 lb. bran, chaff, and chaffed milky corn cobs twice daily; April: 4 lb. bran, 4 lb. lucerne chaff, and 2 lb. crushed oats at each milking; May: 10 lb. lucerne chaff and bran daily.

The Cause of Black Disease and its Method of Transmission.

Being Further Studies in a Braxy-like Disease of Sheep.

[Continued from page 511.]

SYDNEY DODD, D.V.Sc., F.R.C.V.S., Lecturer in Veterinary Pathology and Bacteriology, Veterinary School, The University of Sydney.

The Natural Method of Infection.

Before entering upon a discussion as to the natural method of infection in black disease, it may first be advisable to note some points that have been observed clinically and experimentally in connection with this condition, most of which are already recorded in this and my previous article.

Clinical.—The disease is seasonal, the vast majority of cases occurring from late summer to early winter. In mild seasons occasional deaths will take place throughout the winter. On infected properties, sheep grazing in paddocks well watered by springs but in which the ground is not well drained or which contain swampy areas, not necessarily of very large extent, are subject to a heavy annual mortality from black disease, except in seasons of unusual dryness when the moist places have dried up, whereas sheep kept in paddocks having water from the same sources running through them, but where the ground is well drained naturally, show few losses or none at all. The division between the infected and non-infected paddocks may be merely a wire fence or a stone wall. In infected paddocks that have been artificially drained the mortality has been considerably diminished. In a very dry season, such as that experienced in 1918-19, the death-rate in paddocks known to be heavily infected was unusually light.

There is no evidence of any kind to show that the disease can be communicated directly from one animal to another. It is stated that after the transfer of the whole of an affected flock to a clean paddock a few cases occur for a short time, and then the mortality ceases. These are apparently cases of infection, or rather (as will be shown) of potential infection before removal. Owners have informed me that no cases occur in a subsequent season in a clean paddock (that is, paddocks in which black disease has never been known to occur) to which an affected flock has been removed, but of this latter I have no direct evidence. All the evidence goes to show that the causal organism of black disease is a facultative parasite, and that the places most dangerous for sheep are the springs and moist, undrained areas in the paddocks. The disease appears peculiar to the sheep, for other animals grazing over the same country remain unaffected. Popular opinion considers that the springs and moist places are

the localities whence the disease arises, although the view is that it is due to eating plants growing therein, *e.g.*, watercress. Fluke disease of the liver is very common among all sheep in the area in which black disease is known to occur. Some sheepowners have observed the coincident occurrence of black disease and fluke infestation. This has led a few of them to express the opinion that the former is nothing else but acute fluke disease of the liver. That this is not the case is shown by the fact that fluke disease is common in numerous parts of New South Wales and elsewhere, but black disease or anything resembling it is unknown in many such places.

Experimental.—It has been demonstrated that the administration of large amounts of virulent sporing bacilli by the alimentary tract fails to set up any sign of infection. Consequently the mere ingestion of contaminated water or food can hardly be considered to be the usual method of natural infection. The same deduction may be drawn from the feeding experiments made with minced organs and viscera, &c., from animals dead from natural infection. The subcutaneous inoculation of small amounts of culture are very fatal to susceptible animals, and always gives rise to definite changes at and around the site of inoculation. Mere scarification is insufficient to infect. Seeing that in naturally-occurring cases no cutaneous or muscular lesion is encountered in animals examined immediately they are dead (if one excepts the occasional presence of a clear intermuscular or subcutaneous exudate in certain situations), it is quite reasonable to conclude that the common natural method of infection is not through the skin. The same reasoning may be advanced against the view that the bacilli gain entrance to the body by means of small abrasions of the mucosa of the alimentary tract, including the abomasum. Infection by inhalation may be dismissed as the least probable method of any.

Another important feature of the disease is that of the hepatic lesion or lesions. If this is, as I consider it to be, the primary lesion in black disease, the question at once arises, how does it originate? The writer has made post-mortem examinations on many hundreds of sheep at various times and places, but has not seen these particular hepatic lesions in any condition other than black disease, although focal necrosis of the liver may be caused by other agents. Seeing that experimentally-ingested bacilli fail to infect, one naturally seeks an explanation as to the means whereby the bacilli reach the liver and produce the special lesions therein. After weighing the arguments presenting themselves, I have arrived at the conclusion that the solution of the problem of the natural method of infection and the situation of the primary lesion in the liver is to be found in the liver fluke. If the feasibility of such a hypothesis be accepted, then almost all of the features concerning the transmission of black disease become fairly clear.

The factors that have been found to coincide with the prevalence of black disease are just those which prevail in connection with the presence of recent fluke infestation. Drainage of marshy areas around and along

the course of springs and watercourses, where carried out effectively, has often been succeeded the following season by a greatly diminished mortality from black disease. In fact, before I had demonstrated the cause of the disease, I consistently recommended this plan. When owners now seek advice regarding this condition I generally inform them that if they get rid of the liver fluke they need not trouble very much about black disease. This advice, when followed out by draining the infected places, has at times had a not unexpected result, because paddocks where it was almost certain one could get material in the shape of affected sheep during the season for research work, have now become useless for investigations, as few cases are seen in them, and these at only irregular periods.

Drainage, as is well known, assists in keeping down fluke disease by decreasing the number of water snails (the intermediate host of the fluke). and providing an unfavourable nidus for the fluke embryos, &c. An instance of the foregoing may be cited. A certain paddock running about 2,000 sheep has been notorious for black disease for the past twenty-six years, the average annual loss in it from this condition being about 25 to 30 per cent. The paddock contains several springs and the ground in their neighbourhood was swampy. Up to the end of 1918 fluke disease in this paddock was very prevalent. At the end of that year the paddock was well drained. The season of 1918-19 was very dry. During that year the paddock carried about 1,000 sheep. The mortality from black disease was about 3 per cent. In another paddock, running about 2,000 to 3,000 sheep, where also the previous annual losses from this disease had been considerable, the same conditions obtained in 1918-19 as on the area just mentioned, viz., drainage of the swampy spots and dry season. The percentage mortality from black disease was lowered to about the same as in the previous instance. In both cases the sheep during that season had been under closer observation than usual.

Seeing that the causal organism is a sporing, and in every probability a facultative, parasite, it is not probable that it could have died out in these paddocks in such a short period. The explanation appears rather to be that the intermediate host of the liver fluke, viz., the water snail, had become considerably reduced in numbers, or had migrated to more congenial localities not grazed over by the sheep, and also that many of the fluke embryos, not finding their host, had also died, the consequence being less fluke invasion of the liver of the sheep in these paddocks and less black disease.

In connecting the fluke with the transmission of black disease it is noteworthy that in all undoubted cases of that condition there has been fluke infestation of the liver; in some cases, however, only slight, and the invasion has been recent. The animals have all been in good condition. I have never seen a case of black disease in which the fluke disease was very advanced. This indicates that infection occurs very shortly after the carrier fluke gains admission to the liver, and agrees with experimental evidence, the latter showing that the condition is not a chronic one and that the period of incubation is not a matter of several days. In natural cases the period of incubation, of course, would not commence until the bacilli

had been lodged in the liver. A greater or fewer number of flukes may reach the liver prior to the advent of the carrier, for it is not suggested that every fluke is an actual carrier of infection, although it is a potential one. This is shown by the fact that a large percentage of sheep on infected country, dead from causes other than black disease, have fluke-infested livers. As a matter of fact, it is possible that relatively few of the total number of fluke parasites reaching the liver carry with them the causal organism of black disease, seeing that the necrotic foci in the liver, which are the primary lesions, are usually so few in number. There may be only one such lesion. In view of the relatively small number of bacilli required to infect artificially, the great number of those present in a single hepatic lesion would be quite adequate to account for the symptoms and death in naturally-infected cases. In the few instances where careful search has failed to reveal a definite local lesion in the liver, but where bacteriological or experimental investigation has shown the bacteria to be present in that organ, it is suggested that such are cases of mass infection, the defences of the organ and the body in general having been overwhelmed before any reaction—that is, a local lesion—has had time to become visible to the naked eye. In the early days of the investigations (1914-15) the liver was not specially examined by making numerous incisions for these necrotic foci, and no doubt those situated in the depths of the organ escaped observation during the usual routine post-mortem examination. When, however, it was found that the absence of these particular lesions was more unusual than their presence, special attention was paid to the liver.

In connection with fluke invasion itself, it has been noted by other observers that bacteria (for example, *B. coli*) have been mechanically conveyed to the liver from the intestinal tract by that parasite.

In discussing the role of the liver fluke in the transmission of black disease, there is no doubt that the causal organism of the latter is numerously present in certain paddocks, probably scattered over the whole surface by dead black-disease sheep allowed to rot where they die and other agencies, but, being a facultative parasite, one would reasonably expect it to be more abundant in the situations more favourable to its saprophytic mode of existence, viz., in moist localities. It may be accepted that sheep in such paddocks will swallow varying amounts of the bacilli in question with their food and water, although such animals drink little water when food is succulent. Yet, as has been experimentally demonstrated, the mere ingestion of large amounts of virulent bacilli is insufficient to infect. As already noted, *Fasciola hepaticum* is very prevalent in the affected paddocks. Whether the immature fluke (cercaria) becomes contaminated whilst on the ground, or whether it becomes so during its passage through the anterior part of the alimentary tract, is a matter for speculation, but there is no improbability in the latter.

A feature of the experimentally-induced disease is that if minimal lethal doses of bacilli be injected, its course may be prolonged a day or so, and the lesion at the point of inoculation is more pronounced. One can thus understand that if the number of bacilli introduced into the liver by the

fluke is insufficient to overwhelm the defences of that organ, there is time for a reaction on the part of the latter to occur, and for a definite local lesion to become evident to the naked eye. That such a reaction on the part of liver tissue does take place as a rule is evidenced by histological examination. The result is that the bacilli are confined to the lesion and no systemic invasion ensues, the general symptoms and lesions elsewhere no doubt being due to an endo-toxin.

The seasonal occurrence of black disease may be explained by taking into account the habits of sheep and the life history of the liver fluke. Fluke infestation of animals is generally considered to occur mainly in spring and autumn, although it may take place at any time. In the spring there is little need for sheep as a whole to graze over the marshy places, which are relatively small in area, in an infected paddock, as the animals drink little water then, and the herbage elsewhere is, in general, succulent. In spring and summer, therefore, the probability of the causal organism being conveyed to the liver by the immigrating flukes is not so pronounced. The disease first becomes noticeable in summer. At first the death rate is light, but as the season advances the mortality gradually increases until in late autumn it reaches its height, coinciding with the period at which the migration of flukes to the liver is also at its maximum. The onset of severe frost is generally considered to put a stop to the ravages of the disease for that season, but if the weather be mild, deaths take place throughout the winter. In some places where the winters are not so severe it is stated that black disease may be seen at any time of the year. This latter statement, however, is not to be accepted without reservation, for sometimes any death of sheep is ascribed to black disease merely because the animals have been found dead, no attempts at post-mortem examination having been made. Furthermore, I have known men confidently say that they have known sheep to die from black disease in their district, although they will admit that they have never examined a case of that disease.

In the districts where the disease in enzoötic, the cessation or continuance of infection may be explained if one considers the effects of frosts on fluke embryos and cercariæ. Numbers of the former (not all, by any means) will be killed off, thus lessening the number of cercariæ to be swallowed by the sheep, and consequently the chances of infection by the black disease bacillus also, until next season. Furthermore, provided there is food elsewhere, there is no inducement for sheep to frequent wet places in the winter.

It hardly needs stating that if the causal organism is not present either contaminating the soil, or mixed with the stomach contents of the sheep, no amount of fluke invasion will produce black disease.

Another interesting feature—perhaps unimportant in itself, but forming one of the links in the chain of evidence—is that for several years past the seasons in general have been on the whole dry, and several large sheep-owners have informed me that during the past few years black disease has by no means been so prevalent on their stations as in former years.

Although it may be admitted that the evidence put forward to incriminate the liver fluke in its migration from the exterior of the body to the liver of the infected sheep, as being the mechanical agent in the transmission of the causal organism of black disease is largely circumstantial, yet this explanation of the natural method of infection and the situation of the primary lesion or lesions appears more satisfactory than any other advanced so far.

(*To be continued.*)

School Children's Maize Growing Competition at Yanco.

In order to stimulate interest in the growing of crops, and in agriculture generally, among children on the Murrumbidgee Irrigation Areas, a maize-growing competition was held last year under the auspices of the local Agricultural Society. Seed of nineteen of the earlier maturing varieties was provided by the Department of Agriculture, in sufficient quantity for the sowing of one-tenth of an acre of each, and through the generosity of Dr. Vance, who donated ten guineas as prize money, the Society included the competition in the schedule of prizes at its show. It was anticipated that the exhibits would have been available at the time of the show, but, owing to some of the varieties not being sufficiently matured, it was eventually decided to postpone the judging.

The competition was divided into two sections, one at the Leeton School, under the supervision of Mr. M. R. McGee, and the other at Brobenah School, under the control of Mr. S. C. Small. The prizes were offered for the best dozen cobs, and 5 lb. of shelled maize, to be grown by a school child on the home farm, the conditions requiring that the grower should carry out all cultural operations and irrigations, and keep and exhibit a complete set of notes of these, as well as of the characteristics and habits of the particular variety under trial.

Twelve pupils took up plots at Leeton, and seven at Brobenah, but, owing to accidents to the growing crops through straying stock, every grower did not exhibit. The season was very favourable for maize growing, and some very good exhibits were put before Mr. A. N. Shepherd, Inspector of Agriculture, to whom the Minister granted permission to act as judge. At both schools the winning exhibit was of the Silvermine variety, though at Leeton Funk's Yellow Dent came a very close second. The score card was used in judging, so that each competitor was enabled to see why his exhibit gained or lost points on those of the others. The prize-winners were as follows:—Leeton School: F. Wood, 1st; J. Tiffen, 2nd. Brobenah School: Jean Evans, 1st; B. Smith, 2nd. Champion prize, Jean Evans.

Mr. McGee, who has been appointed by the Education Department, Instructor of Agriculture to the schools of the area, now has in hand a hay-growing trial, in which some sixty pupils are participating, and taking great interest. Such competitions cannot fail to serve the cause of progressive farming in this district in a very valuable degree.

Advice to Intending Growers of Bananas.

W. J. ALLEN and R. G. BARTLETT.

During the past few years many have entered the ranks of banana growers without any previous knowledge, making numerous initial mistakes that could have been avoided if they had been in possession of a few essentials of the business. It is with the object of enabling others to avoid those errors, and so saving them from the expensive method of learning by their mistakes that the following advice and information are given.

It may be said that in New South Wales the A B C of selecting land for a banana plantation consists of A (shelter), B (soil), C (aspect), and a few hints under each heading may be useful.

Shelter.

The value of shelter from southerly and westerly winds cannot be too strongly stressed, for it is a most important factor in the future productivity and permanence of a plantation. Too little attention is given to shelter; bananas are sometimes planted on exposed hillsides, and consequently only moderate results are obtained, and the reason is not far to seek.

Almost the whole of the banana plant is composed of leaf matter. The broad undivided leaf of the plant shows that its natural habitat must have been in sheltered regions, where the leaves would be protected from boisterous winds. Hence it may be inferred that a windy situation is not suitable if large bunches and well developed fruit are desired. The function of the leaf is to obtain from the atmosphere food for the growth of the plant, the motive power for the work of manufacturing the food being obtained from the rays of the sun by means of the green colouring matter (chlorophyll). The water absorbed by the roots, together with the mineral plant foods in solution, is carried to the leaves, and there with the carbonic acid gas of the air, the various organic compounds are elaborated by the plant. The compounds so manufactured are then transferred, and used where required or are stored up in the bulb for future use.

This consideration of the importance of leaf functions shows sufficiently that heavy winds, by cutting the leaves into ribbons, interfere with the manufacture of the food. Shelter is therefore necessary for the proper feeding of the plant; in fact, given good shelter a grower will get better returns from soil that is not so good than from better soil exposed to either westerly or southerly winds. For banana-growing purposes, good shelter increases the land at least 50 per cent., that is to say, land with good shelter is worth twice as much as similar land which is exposed to prevailing winds. Indeed, the chances of success without adequate shelter are remote.

Soil.

The soil most suitable for the cultivation of the banana is a deep free loam, rich in vegetable matter. Good rich scrub land is the most desirable, if it can possibly be obtained, but unfortunately the available area of scrub land suitable for bananas is rapidly diminishing, and it will soon be very difficult to obtain good scrub. Bananas require the best of land, as they take more out of the soil in a given time than any other crop, and seem to require a good deal of potash. Red volcanic soils are most in favour with successful growers, who do not mind if there is a liberal sprinkling of basaltic boulders on the surface.

The formidable appearance of the dense growth of timber on virgin scrub land frequently causes the uninitiated to select places that have been cleared of timber, but they forget the subsequent upkeep of the land that is entailed in such cases in the way of manuring and destruction of weeds. Those who know, and wish to get the best returns for their investment and labour, will select virgin land for preference. There are many reasons for this: for instance, scrub land is neither so costly nor so difficult to prepare and to plant with bananas, as is popularly supposed; it has all its future before it, has not been impoverished by previous crops, and may not require so much manuring.

Virgin soil has not been a storehouse for every weed detested by the farmer, and a careful grower can easily keep it clean, with a consequent reduction of the cost of annual upkeep. With new land the grower will know the history of his plantation, and by careful selection of plants and rigid inspection by Government inspectors, may reasonably expect his plantation to remain free from diseases.

Scrub land (and this is the most important point) undoubtedly produces more bunches and better fruit than any other class of land, and therefore the returns are greater and the margin of profit accordingly. In fact, if this type of land could be found, it is not too much to say that it should be given the preference over all else. However, as virgin scrub is becoming so conspicuous by its absence, attention is being given to lantana land and grass land, and large areas of both have been, and are being, utilised for banana plantations.

Land that has been covered with lantana for a few years can be recommended when scrub is not available. The deposits of leaves, twigs, &c., when decayed, greatly enrich the soil, and the roots bring up plant food from lower levels than those reached by the previous crop. Banana growers nowadays regard lantana as one of the best soil renovators, and not as a pest. This class of land simply requires brushing and burning off, after which the roots are grubbed out with a mattock, and the ground is ready for planting.

Grass land, now that banana growing is proving so profitable, is also receiving attention, and considerable areas are being converted into banana plantations. In this case care must be taken to see that the grass land has

originally been heavy scrub. It should be ploughed lightly with a disc to kill the grass, and then given two thorough good ploughings to stir and break up the soil. To sweeten it after the grass crop, it is necessary to use a dressing of agricultural lime (half a ton to one ton to the acre) before the final ploughing. If this is done, fairly good results will be obtained for a number of years, though artificial manuring will have to be resorted to sooner or later to keep up the production.

Aspect.

The aspect of the land has an important bearing on the production of the banana farm. During the winter the plantation is semi-dormant, and needs as much sun as it can possibly get. As "the morning sun is the growing sun," it can readily be seen that the best aspect for the plantation is northerly to north-easterly.

A site near the sea, or with a direct air line to the sea, often produces the best fruit, and apparently proximity to the sea is almost essential to ideal conditions.

Diseases in Tomato Seedlings.

Leaf-spot and blight were prevalent in some districts last year. Two or three parcels of seedlings have already been received (11th July) attacked by these diseases. Both diseases are of fungus origin, the former being caused by *Septoria lycopersici*, and the latter by *Phytophthora* sp.

Leaf-spot is recognised by pale or ochre-coloured spots, on which are produced numerous minute black bodies which contain the spores. Affected leaves have a tendency to curl. Seedlings attacked by blight are generally invaded on some part of the stem; in the majority of cases at or near the ground-line. The plants fall over and wilt. Both diseases spread rapidly, and prompt action should be taken to arrest either on its appearance.

The following measures for control are recommended :—

1. Remove and burn all diseased plants.
2. Spray the remainder with Bordeaux mixture in the proportion of 1 lb. of copper sulphate and 1 lb. of freshly burnt lime to 10 gallons of water*. Should wet weather prevail, other sprayings may be necessary at intervals of about ten days.
3. Avoid keeping the seed-bed too moist.
4. Water the soil rather than the plants.
5. Shelter the beds with some impervious material during wet weather.

—G. P. Darnell-Smith.

When lopping a tree, it must be borne in mind that the larger and older the tree the greater the shock it will suffer if large branches are cut off; it is better, therefore, to commence with a light pruning, and on no account to cut the branches off near the trunk. As a general rule the right time to prune or lop is in the winter, but the exact time is indicated by the tree being at rest, a state indicated by the fact that none of the foliage is bursting into young leaf.—J. H. Maiden.

* A circular on the preparation of Bordeaux mixture can be had on application to the Under Secretary and Director, Department of Agriculture.

Harvest Report.

Glen Innes Experiment Farm.

R. H. GENNYS, Manager.

The past season was a good one generally, though wind and heavy rain knocked down some 30 acres of Algerian oats and Haynes' Blue Stem wheat. The other crops stood up to it well, though from 5 feet to 7 feet high. The larger portion of the crops was sown fairly early, and these areas were free from disease and the grain was of good quality. In the later sown areas, comprising sowings of Florence and Thew wheats, and Algerian and White Tartarian oats, there was some rust, and Thew failed badly with only about half the yield of Florence, though grown beside it under similar conditions. A spell of dry weather at a critical time also interfered with the late sown crops, except Florence, which was little affected thereby. The hay yields, which are still in stack, can only be estimated, but 44 acres of Genoa, Marquis, and Haynes' Blue Stem wheats, and 4 acres of Sunrise oats, yielded very heavily (about 4 tons to the acre), while Algerian, the only variety of oats, other than Sunrise, that was cut for hay, should go about 2½ tons, its average being cut down by the late portion of the crop being short. In the manurial experiments, however, this prolific variety yielded 79 bushels to the acre in the complete manure plots, while half an acre of Florence wheat in the rotation experiments yielded at the rate of over 41 bushels to the acre. The last mentioned crop was sown with red clover, which has grown splendidly since the wheat was harvested.

The yields of the commercial areas are not strictly comparable, as they were sown at various times and in different paddocks, the oats getting the worst of the season, as they were chiefly in the later sowings and met more adverse conditions.

Yields of Wheat Varieties.

Variety.	Total area.	Yield per acre.
	acres.	bush. lb.
Florence	70½	34 0
Genoa	35¾	35 48
Marquis	18	28 15
Thew	18	16 3

A total area of 142½ acres yielded 4,479 bushels, or an average of 31 bushels per acre. In all varieties the grain was of good quality, except Thew, which was pinched.

Yields of Oats Varieties.

Variety.	Total area.	Yield per acre.
	acres.	bush. lb.
Sunrise	14	47 11
Ruakura	2	44 11
Algerian	17	39 17
White Tartarian	7	25 33

White Tartarian met with the worst weather conditions.

Some Germination Tests of Prickly Pear Seeds.

E. BREAKWELL, B.A., B.Sc., Agrostologist.

In order to put the germinating qualities of prickly pear seed to the most thorough test possible, a series of experiments was initiated in 1917 by which seeds, some first subjected to various treatments, were placed under observation in the Department's seed-testing laboratory and their behaviour carefully noted to date. The results of these experiments are set down hereunder, and from them two main conclusions may be drawn :—

1. That prickly pear seeds possess remarkable viability, inasmuch as intermittent germination has occurred over a period of not less than four years, while, judging by the healthy appearance of the remaining seed, future germination is still possible.

2. That the different preparatory treatments do not increase the germinating properties of the seeds, those subjected to test without treatment germinating the best.

Test No. 1. (Commenced 12th June, 1917.)

(*a*) Seeds soaked for sixteen hours at a temperature of 98 degrees Fah. and then for six hours at a temperature of 100 degrees Fah. Then placed between moist blotting-paper and put in germination chamber at a constant temperature of 27 degrees Cent. Total, 200 seeds. One seed germinated 25th October, 1919.

(*b*) Seeds rubbed with a hard stone and then placed between moist blotting-paper, &c., as in (*a*). Total, 100 seeds. None germinated to date.

(*c*) Seeds baked and then placed between moist blotting-paper as in (*a*) and (*b*). Total, 100 seeds. None germinated to date.

Test No. 2. (Commenced 28th June, 1917.)

(*a*) Seeds soaked for six hours at a temperature of 100 degrees Fah. and then placed between moist blotting-paper and put in a germination chamber at a constant temperature of 27 degrees Cent. Total, 200 seeds. None germinated to date.

(*b*) Seeds subjected to no treatment whatever, but placed in the ordinary way between moist blotting-paper, &c., as in (*a*). Total, 100 seeds. Ten seeds germinated to date, as follows :—5th July, 1917 ; 13th July, 1917 ; 13th October, 1919 ; 25th October, 1919 ; 4th November, 1919 (two) ; 10th November, 1919 ; 14th November, 1919 ; 9th January, 1920 ; 7th April, 1921.

(*c*) Seeds soaked in caustic soda and then placed between moist blotting-paper, &c., as in (*a*) and (*b*). Total, 100 seeds. One seed germinated 25th October, 1919.

Test No. 3. (Commenced 4th November, 1918.)

In these tests the germination of prickly pear seeds from emu droppings was tested. They were carried out at the suggestion of Dr. Cleland of the Board of Health. No treatment was given to the seeds.

(*a*) Seeds placed between moist blotting-paper and put in a germination chamber at a constant temperature of 27 degrees Cent. Total, 100 seeds. One seed germinated 9th December, 1918; three, 29th September, 1919; two, 3rd February, 1921; one, 7th April, 1921. Percentage of germination to date, 7.

(*b*) Same as (*a*). Total, 50 seeds. Single seeds germinated 3rd January, 1919; 27th September, 1920; 9th October, 1920; 13th November, 1920.

(*c*) Seeds placed in soil in a pot. Total, 50 seeds. Single seeds germinated 29th November, 1918; 14th December, 1918; 5th January, 1919.

The foregoing tests were carried out by Miss M. Bates, and are being continued.

Newly Recorded Weeds.

At a meeting of the Linnean Society of New South Wales, on 25th May, Mr. W. F. Blakely exhibited, from the National Herbarium, two weeds not hitherto recorded for the State.

Amarantus deflexus L., "Low Amaranth," common on the railway line between Cowan and Hawkesbury River. (W. F. Blakely and D. W. Shiress, February, 1921.) This plant is widespread throughout Europe, and appears as a weed in other parts of the world. It has the general appearance of *A. macrocarpus* Benth., a native species, from which it differs in the mostly terminal, slender paniculate inflorescence, and in the relatively smooth pericarp. Professor Ewart (Proc. Roy. Soc. Vic., xxxii., 1920, 190) records it for Victoria.

Xanthium commune Britt., the "common cockleburr" of America, which was recently forwarded for identification by Mr. C. A. Horning, of Ebenezer. On investigation two other specimens were found under *X. strumarium*, the Noogoora burr, namely from Cattai, near Windsor (V. C. Giles, 1915), and near Dunedoo (M. Beahan, 1918), thus indicating that this obnoxious plant is spreading unnoticed. The new burr is similar in habit to the Noogoora, but is readily distinguished from it by the more ovate, densely uncinate pubescent burrs. As far as can be ascertained, it is new for the Commonwealth.

Mr. Blakely also exhibited fresh specimens of *Euphorbia Drummondii* Boiss., from Barellan (T. A. Field), with the leaves, flowers and fruits infested with bright pink galls, which give the plant a striking floral appearance. It is not known what physiological change the galls would impart to the plant, or whether they would be injurious to grazing animals. —J. H. Maiden.

Good results are not generally obtained from self-sown Sudan grass, and as the majority of the roots are killed by frost, it is advisable to re-sow each spring.—J. N. Whittet, Assistant Agrostologist.

Black Spot or Anthracnose.

H. L. MANUEL, Viticultural Expert.

Weather conditions experienced last year proved ideal for the development of fungi. The winter months were very wet, and in many parts wet spring and summer conditions existed, added to which "mugginess" was general. Such conditions as these were almost disastrous to the vineyards in the Murrumbidgee Irrigation Area, where a number of growers had not taken precautions to prevent the invasion of downy mildew and black spot.

In the metropolitan areas growers were not in such a bad plight, but a considerable quantity of fruit was badly spotted.

To those who neglected swabbing last year, it will be as well to call to mind this omission, in the hope that it will lead them to attend to the operation this season. Up to the time of writing, the winter has been very moist, and if by any chance the spring and summer months are similar to those of last year, we can look for another bad outbreak of the disease.

We cannot foresee what the weather conditions will be in the future, but I would advise growers not to gamble on the weather, and therefore to swab if only as an insurance. With neglect, one not only stands to lose his crop, but also many vines, for another bad season following upon the last may easily cause numerous deaths.

The fungus attacks the green portions of the vine, and the shoots, leaves, and fruit assume a slightly different appearance. On the berry small, dark brownish spots appear on the surface, and in a short time the centre of the spot sinks. The spot grows larger, and the sunken centre becomes ashen-grey. The margin of the spots become purplish, and the three colours appear in concentric rings.

On the shoots and leaves similar symptoms appear, except the purple margin. The shape on the shoots is eliptical, whereas on the fruit it is more roundish. The diseased parts become shrunken, and appear black and as if burnt. On the leaves the spots are black, and at a later stage the centre falls out, giving it the appearance somewhat of shot-hole.

When the fruit stalk is attacked, the probability is that the whole bunch will dry up. The berries are not only spoilt in appearance by the sunken black markings, but they become deformed in shape, and in many instances they split.

The disease develops more rapidly in humid climates, and particularly on land which is low-lying. Free moisture on green portions is necessary for its development, as well as a humid atmosphere. It requires less heat than downy mildew, and consequently will develop at a very much lower temperature. The disease is an internal one, the mycelium working between the cells of the plant and living upon the surrounding sap.

As it develops it puts off organs of reproduction known as summer spores, which reproduce the disease during the growing period of the vine, and form at the bottom of the shankers, being joined together by means of a gummy substance, which requires a certain amount of free moisture to dissolve it before the spores are set free. The germination of the spores takes place by sending a long filament into the plant tissues. Under favourable conditions during the following spring the gummy substance covering the spores softens, and the spores are scattered to germinate in the usual way.

Controls.—To control the disease attention is necessary to several points.

The first is to burn off all affected cuttings.

Summer treatment with Bordeaux spray is not so effectual for black spot as it is with other fungoid diseases, and we must resort to winter swabbing as our main safeguard.

It is questionable whether early swabbings are beneficial. However, in the Irrigation Areas that had such a bad doing last year, it would be advisable to give two treatments, the first one about three weeks before the second, and the second a couple of weeks before the bursting of the buds. The second swabbing should be done at a period when the coating of the winter spores is likely to be softening, and therefore would prove more beneficial. Besides swabbing the stem and main arms of the vines, it is advisable also to apply the mixture to the trellis-posts or stakes, as these harbour winter spores.

Two swabs are used as follows:—(1) 50lb. sulphate of iron, ½ gallon commercial sulphuric acid, 10 gallons of water. [(2) 1 gallon commercial sulphuric acid, 10 gallons water.

The sulphate of iron mixture appears preferable. The mixing of both solutions must be done either in a wooden or an earthenware vessel. Pour the sulphuric acid on the sulphate of iron and stir well, then add the water (which should be boiling), slowly stirring the whole time. The mixture is applied to the vine by means of a brush. A small tarbrush with a long handle will be found convenient for the purpose. The spray manufacturing firms have specially-constructed lead-lined pumps for use on large areas, but the brush certainly makes the better job, and in dealing with small areas it is well to adhere to this method. The best time to make the application is on cloudy days.

Our main commercial varieties chiefly affected with anthracnose are:—Sultanas, Doradillos, Muscats, Currants, Grenache, and Malagas.

A few words may be added for the special benefit of irrigationists. With vineyards which suffered badly last season, it will be as well to irrigate sparingly the coming season, for the more sappy the growth, the less resistance there is to the disease. The vines that were badly hit last year cannot be expected to produce a big crop this season, and consequently one should as much as possible save the wood for the following year.

Pure Seed.

Growers Recommended by the Department.

The Department of Agriculture publishes monthly in the *Agricultural Gazette* a list of growers of pure seed of good quality of wheat, oats, maize, sorghum, Sudan grass, potatoes, and other crops, in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

The list is compiled after inspection of the seed and report by a field officer of the Department (preferably during the growth of the crop), and farmers who have pure high-class seed of good quality of any variety of farm crop are invited to communicate with the Under Secretary and Director, Department of Agriculture, Sydney.

The Department does not undertake to buy any of the seed.

**Sudan Grass* :—	Manager, Experiment Farm, Cowra. Manager, Experiment Farm, Temora. J. Cavanagh, Curlewis.
Clovers :—	
Shearman's Clover (roots) ...	J. H. Shearman, Fullerton Cove, Stockton.
Maize :—	
U.S. 133...	P. Gersbach, Farm 330, Leeton.
Golden Glow	J. F. Chick, Hillview, Tenterfield.
Wellingrove (late Early Yellow Dent).	Manager, Experiment Farm, Glen Innes.
Iowa Silvermine (late Silvermine).	Manager, Experiment Farm, Yanco.
Funk's Yellow Dent	J. Ditzell, Lansdowne, Inverell. Manager, North Bangaroo Stud Farm, Canowindra.
Boone County White	J. Chittick, Kangaroo Valley.
Leaming...	Manager, Experiment Farm, Grafton.
Golden Beauty	R. Richardson, Mondrook, Tinonee, Manning River.
Manning Pride	S. Smith, Karaak Flat, via Wingham.
Golden Nugget...	J. W. Smith, Wauchope.
Manning White	A. McM. Singleton, Henley, Sydney.
Large Red Hogan (late Red Hogan).	Principal, H. A. College, Richmond.
Craig Mitchell	W. D. K. Humphries, Muswellbrook.
Early Clarence	F. T. Dowling, Tumut.
Fitzroy (late Improved Yellow Dent)	D. J. Dorward, Tayfield, Cundletown. J. C. Duff, Mount George.
Narrow Red Hogan	C. and L. Bowden, Midlorn, West Maitland. P. Mooney, Dumaresque Is., Taree.
Golden Drop	C. and L. Bowden, Midlorn, West Maitland.
King of the Earlies	C. and L. Bowden, Midlorn, West Maitland.
Goldmine	A. Louttit, Moruya.
Yellow Moruya	A. Louttit, Moruya.
Golden King	E. Blackburn, Warkton, Coonabarabran.
Cocke's Prolific...	Manager, Experiment Farm, Lismore.
Manning Silvermine	R. Dyball, junior, Taree Estate, Taree.
Golden Superb	J. H. Teague, Bellimbopinne, via Taree.
Hickory King	C. Lane, Glenthorne, Taree.
Grain Sorghums :—	
Milo	Manager, Experiment Farm, Cowra. Manager, Experiment Farm, Bathurst.
Feterita	Manager, Experiment Farm, Cowra.
Manchu Kaoliang	Manager, Experiment Farm, Bathurst.

* Sudan grass should not be sown until all danger of frost is passed.

PURE SEED—*continued.*

Sweet Sorghums :—	
Saccaline	Principal H. A. College, Richmond. Manager, Experiment Farm, Lismore. Manager, Experiment Farm, Cowra.
Millet :—	
Japanese	Manager, Experiment Farm, Coonamble.
Potatoes :—	
Satisfaction	O. E. Silk, Nimmitabel. J. D. Morse, Black Mountain.
Surprise	O. E. Silk, Nimmitabel.
Lucerne :—	
Grown from Hunter River Seed	W. E. Myring and Sons, Mongaroi, Pallamallawa.
Coolah	R. J. Crossthwaite, Pilca Butta, Leadville.
Peanuts :—	
White Spanish	Manager, Experiment Farm, Grafton. Manager, Experiment Farm, Yanco. Manager, Experiment Farm, Lismore.
Virginia Bush	Principal, H. A. College, Richmond.
Valencia	Manager, Experiment Farm, Grafton.

In addition to those tabulated a number of crops were inspected and passed, but as the growers failed to forward samples their seed has not been listed.

NOTE.—The Department of Agriculture has a small quantity of miscellaneous seeds, such as velvet beans, cowpeas, soy beans, pop corn and sweet corn, for distribution to farmers, and can also supply samples of several varieties of field maize for trial (including some new varieties from America and Africa). Application should be made to the Under Secretary and Director, Department of Agriculture, Sydney.

BLACK APHIS INFESTING BROAD BEANS.

A VEGETABLE grower, whose broad beans were infested with "little black insects about the size of a pin's head," asked the Department what he should do to get rid of them. The reply was that the broad beans were evidently being attacked by black aphis, which collect in thousands on the tender growing points of the plant and live by sucking the sap. Stomach poisons like arsenate of lead are useless in such cases, and it is necessary to spray with a wash that causes death by irritation or suffocation. Kerosene emulsion, or a soap-wash or nicotine extracts may be used, the nicotine extract being perhaps the safest, though the soap-wash (made by dissolving ¼ lb. soap in two gallons of water and applied warm) has given fairly satisfactory results.—A. H. E MCDONALD, Chief Inspector of Agriculture.

FAULTY HIVES AND THEIR EFFECTS.

FAULTY covers on bee hives, which allow water to get on to the combs, would, if brood-raising were being carried on, be likely to cause chilled brood, and also to affect the temperament of the bees. It is not likely that brood disease would develop from such conditions, but the colonies would certainly be retarded in their work, and from the effect of inefficient covering at this period of the season spring-dwindling might result.—W. A. GOODACRE, Senior Apiary Inspector.

Horticulture.

E. N. WARD, Superintendent, Botanic Gardens, Sydney.

More graves are dug for trees than for any other form of plant life. A forester expects big losses when he is compelled to plant by hand as a means of reafforestation, for he is compelled by force of commercial circumstances to plant roughly without much preparation of the soil; but there is no excuse for people who are planting for their own individual pleasure, or even as part of a town improvement scheme, setting trees in pot holes and then leaving them to the attacks of insects and predaceous animals. A young tree requires just as much care as any garden or orchard plant. It is difficult to imagine a man planting an orchard in a rabbit-infested district without protecting his trees, and without pruning, spraying, and, in a dry season, even watering them, yet this is what happens to many trees planted for shade. Planted "for the grateful shade these trees will give to the children of those who fought to keep the good flag flying" was said in a certain town over the planting of a tree for every fallen soldier a couple of years ago, but out of nearly one hundred trees planted about half a dozen remain to tell the tale of what happened to the others—unwatered, unweeded, unstaked, unpruned, inadequately protected. A few suggestions may be offered to those who contemplate tree planting, and especially to any who aim at the beautification of a street or park.

How to Plant Trees.

For a specimen isolated tree, measure off a piece of ground 4 feet square. Dig out the top foot of soil, then with a crowbar, pick, or mattock, if the soil be heavy, break up the bottom to a depth of 4 to 6 inches and leave it where it is, and finally throw back the top foot of soil. In the centre drive a stout hardwood stake, 2 inch x 2 inch, tarred at the bottom, then fix firmly four solid posts 3 feet apart and fasten to three sides a stout mesh wire-netting. Plant the tree carefully, as one would a rose plant in the garden, not forgetting to water it immediately after planting. Tie a piece of soft but durable marline to the stake, make a loop letting the plant swing loosely in the loop, and fix this loop so that in the prevailing wind it will be extended with the wind, not blown up against the stake. Fix up the fourth side of the enclosure with wire-netting, and make a mental note that without rain and with plenty of wind the soil will dry very quickly. The plant should be regularly watered, and the soil cultivated until it is established. The first effort the tree is called upon to make is to struggle through its first summer before its roots have got a firm hold. It is a great mistake at planting time to add manure to the soil, neither should the natural soil be very much altered. Manure helps a tree to make a quick growth that cannot be maintained after the manure is spent, and the plant suffers a check. Rich soil added to the natural also has its bad effects, because when the roots are ready to expand they dislike leaving a rich soil to enter something inferior,

and a check is again the consequence. It is also a mistake to mulch the surface with rich manure, as this only encourages the roots to remain near the surface, whereas they should be encouraged to go down.

How to Care for Them.

In one year from planting the tree should be examined, if possible by an expert. It may require pruning and it may not; if everything is going all right, every bit of foliage should be left, for this is really the lungs of the plant, but if the plant is showing signs of wanting to grow outwards instead of upwards, or to make a head before its time, then it requires assistance and a little guiding by cutting out all strong growths but one, which should be tied to the stake as a leader. This leader must be maintained by checking any other branchlet that shows signs of growing stronger; in other words, guide the main sap flow into the leader, and remember that any cutting away of growth from a maiden tree should be what is necessary only, and that even this is more or less injurious to its health.

As the leader becomes strong and stout, greater care should be given to the method of supporting it to the stake. Ordinary marline is apt to cut and chafe, and the safest method is to make a loop with a piece of old hose pipe, threading through the pipe a piece of pliable wire. Nothing is more important than regularly to examine these trees. A perfect leader may be, and often is, choked by a tight tie, that was perhaps loose enough when it was attached, but that made no allowance for the fact that with kind treatment and congenial weather a young tree swells its stem very quickly.

Watch for pests; if there is to be any disease it will come later. The worst pests on young trees are leaf-eating insects; these should be poisoned, and the best way is to spray with arsenate of lead. The insects keep on feeding on the foliage, and the least bit of the sediment left by the spray will kill most insects. Some young trees are injured by borers, especially our wattles and some imported European trees, but fortunately the presence of these insects is early evident by the borings on the bark from the hole where the insect has entered. Poke into the hole with a piece of stick; this may kill him, but there is a possibility that his brother remains alive, and it is wise to mix into some clay a little bi-sulphide of carbon and seal up the hole with it. If the fumes from this do not kill him he will be too uncomfortable to stay where he is and will do his best to get away. The best preventive against these ravages is kind treatment of the tree and good cultivation.

Planting Avenues.

Where rows of trees are desired—whether in the centre of a street or along both sides, along a country road, or approaching some building—always cultivate a strip of ground in preference to digging the holes as for a single tree.

Plough a strip not less than 5 feet wide as deep as possible, and instead of breaking up the bottom with a crowbar or pick, rip up the bottom of the furrow with a plough from which the mouldboard has been removed. This is no more costly than preparing separate holes by hand labour. The advantage of working a strip is that an even water-table is created and the roots of

trees have a free run of broken-up ground. Even if only the ground immediately round the trees is kept cultivated, the strip of soil never returns to the packed state in which it was naturally, and will always in a measure encourage roots from any kind of vegetation. Trees planted in ploughed strips grow very much better than those in holes, however well prepared.

What to Plant.

Care should be taken in choosing a suitable tree for the particular kind of soil, aspect, and climate. General lists are almost useless. Trees that could be recommended for, say, Lismore and Grafton would, perhaps, be useless at Ballina; and yet trees at all three places could be grown that would be out of the question on the tablelands, as, for instance, at Glen Innes. Many trees may be successfully grown round such elevated places as Wahroonga that would be waste of time in the nearer Sydney suburbs. A selection of trees for various districts and aspects of the State will be given next month.

Trial of Jerusalem Artichokes.

With a view to ascertaining the value of artichokes as a forage crop for pigs, a trial was conducted at Wollongbar Experiment Farm during the past season. On land into which a summer legume crop had been ploughed in July, sets were planted, 2 feet apart, in drills that were 4 feet apart. The season was favourable, though heavy rains in April delayed harvesting until the tubers had commenced to rot. As pigs could not be turned on to the plots, the tubers were dug, bagged, and weighed at the end of April, the yield being at the rate of 12½ tons per acre. Harvesting artichokes for pig food is not a commercial proposition, as it costs £2 10s. to £2 15s. per ton, owing to the small size of the tubers and their distribution.

Mr. G. Nicholson, Experimentalist at Wollongbar, in reporting those results remarks that artichokes cannot be considered a serious rival to the sweet potato in that district, for the following reasons:—

1. Sweet potatoes are better yielders, larger, and cheaper to harvest.
2. Sweet potatoes will keep in the ground throughout the winter, while the artichokes commenced to rot soon after maturity.
3. Surplus sweet potatoes can always be marketed, while artichokes were unsaleable locally last season.
4. It was only after considerable trouble that the pigs were made to eat the artichokes. Preference is always shown for the sweet potato.

These remarks are also applicable to districts similar to that in which the Wollongbar Farm is situated, but where sweet potatoes cannot be grown satisfactorily, owing to climatic and soil conditions, the artichoke is a valuable crop. At Hawkesbury Agricultural College, artichokes have been found very suitable on clay soils. A prolific yield is obtained and the tubers are not harvested, as it is found that the most satisfactory way of handling the crop is to turn the pigs in to forage for themselves. Usually one planting will provide a crop over a number of years, as sufficient tubers are left in the ground each year by the pigs to produce a good stand the following season.—A. H. E. McDonald, Chief Inspector of Agriculture.

Co-operation Among American Fruitgrowers.

The whole of the marketing of both fresh and dried fruit in California is done co-operatively, and practically every variety of fruit produced in any quantity has its own separate organisation for selling the crop. I visited the very large plants of the Prune and Apricot Growers' Association of San José, the Peach Packers' Association and the Raisin Growers' Association at Fresno, the Walnut Growers' Association, and the Citrus Growers' Association, Los Angeles, and others. As practically nothing in the way of fruit is now sold outside such organisations, the prices are fixed by these organisations and very little produce is sold in an open market. The only large fruit market I saw was at San Francisco, and this was very poor indeed. A great deal of fruit was stacked on the footpath and mixed with fowl coops, etc. Generally speaking, the system in this open market was not nearly as good as in Sydney.

Packing and grading is very thoroughly done. Grapes are packed first in small punnets, each holding about 6 lb., and then packed four punnets to a box. Practically all grapes are delivered to packing houses, and thus the whole of the pack is standardised. Special facilities are made on the railways for handling fruit; all the cars in use are refrigerated, and the fruit is air-spaced in the cars with a space left right round the car, laths being tacked across each layer of boxes to prevent any movement of the cases. Californian grapes are railed 2,500 miles to the eastern states, the trip occupying six days, and I saw these grapes being sold in New York and Chicago in perfect condition. The shipping grapes grown are mostly White Malaga and Flame Tokay. The former I have not seen on the Murrumbidgee Irrigation Areas, but Flame Tokay is well known at Leeton, being very subject to sun scald. In California they do not have this trouble with it.

Citrus growers' co-operative packing houses are in a particulary strong position and absolutely rule the market. Taken all round, the distribution of fruit is much more highly organised in America than in Australia and fruit forms a very considerable portion of the food of the people. There is no shadow of a doubt that the salvation of the American fruitgrower has been co-operation.—J. Brady, Cannery Superintendent, in a report on his visit to America.

Uniting Colonies of Bees.

A good method for uniting colonies of bees is as follows:—

Late in the afternoon, the queen should be removed from the weakest stock and after the bees have settled down the hive should be carried to the one with which it is to be united. Remove the cover from the hive on the permanent stand and place a sheet of newspaper over the frames; the removed colony is then freed of its bottom board, and placed on the paper over the permanent hive. The bees will unite gradually through holes they will make in the paper, and there should be no fighting or balling of the queen. In a few days time the colony can be made compact.

Weak colonies can generally be united with success by carefully lifting out the frames containing bees from the hive made queenless and placing them direct in a space made to receive the frames in the hive they are to be united with. Do the work about dusk and be careful not to excite the bees more than is necessary.—W. A. Goodacre, Senior Apiary Inspector.

Poultry Notes.

August.

JAMES HADLINGTON, Poultry Expert.

Notwithstanding the fact that the autumn and winter months have not been favourable to egg-production, there appears to have been a much larger number of early chickens hatched than is usually the case up to this time of the year.

In advocating early hatchings the writer has not encouraged the idea that all the chickens required should be hatched out in the winter months, but that incubation should be spread over the months of June to September, inclusive, and in such a way that a portion of the very early chickens would come in for breeding stock and the balance be regarded as layers. It has also been pointed out that while this is so, August is probably the best month in the whole season for hatching pullets intended for laying stock. Having in view these facts, it is somewhat disconcerting to find that many poultry farmers have gone to extremes in the early hatching, and are found to have had all their brooding accommodation full and even congested before the middle of July. So much so, that in many cases incubation has had to be suspended while the chickens already hatched are growing up to the stage when they can be safely transferred to other accommodation to make room for any further batches. In some cases the chickens have been moved on too quickly out of the brooders, which is worse than suspension of incubation.

The greatest drawbacks consequent upon swamping the brooder accommodation in the way indicated are, first, that the limited rearing plant found on most farms will not admit of such a large number of chickens being put through in this way as if a regular procession of hatching had been arranged to co-ordinate with the rearing accommodation throughout the different stages, being spread over more months in regular order; and, secondly, the suspension of incubation about the middle of July has cut out the period during which the largest percentage of best layers is hatched, which, moreover, would still be early. True, there will be a set-off in the extra value of the very early-hatched table cockerels, but it is more than doubtful if this will anything like counterbalance the two important drawbacks mentioned, because after all the layer is the most valuable asset on a farm.

Congestion in rearing at any stage means poor development, and poor development, no matter what the breed or strain, means indifferent layers. I will go further, and say that good rearing in the right months is the most important factor in the production of good layers, and conversely badly reared chickens are on the whole bad layers, no matter what their breeding may have been.

However, early hatching is much preferable to late, and it is satisfactory to find that a lesson is being learned that, at any rate, will eliminate much of the prodigious wastage in chicken life that has been a feature of the past.

Hot Water Brooders.

The large number of brooding plants now installed on the hot water circulating system, and the mistakes that are being made, both in the installations and in the operation of them, call for some advice on both aspects.

Dealing with the installations first, it has to be stated that many are faulty in construction, due in some instances to the plumber, and in others to the poultry-farmer, who has conceived notions of his own that deviate from the plans issued by the Department. The result is trouble that would not have eventuated had the plans been adhered to in every detail. Then again, such troubles as do arise might be overcome if the parties concerned would seek the advice which is always available to them. Many who have installed these plants have put up with indifferent working of the circulation, not realizing that more efficient work is obtainable if the operator is put on the right track.

There are two principles upon which hot water circulating brooders can be heated. In one, well known to almost every plumber, the heater is sunk below the level of the pipes to be heated in the same way as for ordinary heating purposes, on the general principle that hot water rises and will circulate better with a gradient. In this system the expansion pipe must be at the highest point of the circulation, viz., the far end. It is, however, not desirable to have a grade in brooder work unless the floor of the brooder house is itself on a grade, as in a case where it is built on a slope. In most cases it is advisable to have the floor of a brooder house level, and it follows that the pipes will require to be level, and about 5½ to 6 inches above the brooder floor. Usually, too, it is undesirable to sink the brooder below the level of the floor, on account of the danger of soakage, or of flooding, which might put out the fire in the night or be a nuisance at any time. To have the brooder on the ground level is therefore the safest plan.

The method of working a hot water circulating system on a level line was discovered by the writer, and was adapted to brooder houses some years ago, and one of the difficulties encountered in getting installations put in according to the plan worked out has been the fact that the principle has not been properly understood by many plumbers. Indeed, the writer has on many occasions been told by experts in hot water circulation that the system could not be worked on a level, but the facts are that it does work, and works well if properly installed in every detail according to the plans issued by the Department. Ocular evidence of this can be seen at Hawkesbury Agricultural College, at Grantham Stud Farm, and now on the sections of hundreds of soldier settlers, as well as on commercial farms throughout the State, and it is only where there is faulty construction or deviation from the plans that trouble is encountered.

Points in Construction.

On ground level installations the following points must be strictly adhered to:—

1. The heater should have a coke capacity equal to a Metters' No. 5 or a Danks' No. 10D "Ideal," if it is to burn from nine or ten hours without re-stoking.
2. The bottom of the supply tank should not be higher than the set-off where the damper is operated, that is, at the intersection of the chimney with the heater. The expansion, sometimes known as the exhaust pipe, must rise from the top of the outflow pipe close to the heater and be taken to a height of 12 feet; this pipe must not be less than $1\frac{1}{4}$ inches.
3. *The pipes running through the brooders must be prefectly level from end to end to insure good circulation.* If not level the circulation will be sluggish, consequently the radiation will be insufficient to maintain a proper temperature. The heaters referred to will work 50 feet of brooders efficiently if properly stoked.

How to Stoke the Heater.

Bad or indifferent stoking is one of the most prolific causes of trouble. It is therefore necessary to give some instruction on this operation.

1. The fuel should be ordinary gas coke, free from dirt or coke dust, and should be broken to a fairly uniform size, and no pieces should be larger than an egg.
2. When full heat is required, the grate at the bottom of the fire box must be kept free from ashes, clinkers or spent coke. Unless this is properly attended to the fire will not burn brightly, and the circulation will be so sluggish that very little radiation will be secured.
3. When stoking up for the night, which should be done about 10 p.m., there should be a few inches deep of good, clear fire upon which to fill the coke that is to burn during the night. To obtain this it will be necessary to clean the rubbish from the fire bars previously.
4. The next important operation is the manipulation of the damper on the top of the stove, and the draught-plate at the bottom. Co-ordination of these, one with the other, is vital to good stoking. Usually the damper is left about $1\frac{1}{2}$ inches open, and the draught-plate at the bottom about $\frac{1}{4}$ to $\frac{3}{4}$ of an inch open, according to the position of the boiler and the character of the weather. On a breezy night, for instance, a $\frac{1}{4}$-inch might be sufficient, while on a very still and perhaps frosty night, it may be necessary to have it much wider, and so on. After all, it must be largely a matter of judgment according to circumstances and conditions, but unless proper adjustments are made, failure will result.

Control of the Temperature.

The control of the temperature in the brooder units is the next thing to claim attention. If the box has been properly constructed, and all the factors already mentioned attended to, there should be no difficulty in maintaining the required temperature, or in the regulation of it, but in many cases the method of regulation and ventilation does not appear to be properly understood. If it is desired to reduce the temperature in any or all of the units comprising the system, all that is necessary is to lift the lids to a height sufficient to let the surplus heat escape. This may be only a $\frac{1}{4}$ of an inch, or it may be 2 inches, or even more—the height to which it is necessary to lift the lids is easily learnt by watching the thermometers, one of which should be in each unit, with the bulb hanging 2 inches from the floor of the brooder.

It is best to maintain sufficient heat to allow of the lids being lifted somewhat whenever possible, because the air in the brooder is naturally better when the lids are open than when they are closed down. Nevertheless, if the boxes have been constructed with the *small holes at the bottom as per plan* the brooders will be well ventilated for small chickens.

Departures from the Plan.

In connection with these ventilation holes, it has been noted that many operators, not understanding their purpose, have reversed the front so as to bring the holes to the top of the brooder boxes. This is wrong, and it defeats the object for which they are intended, viz., to insure that the vitiated air thrown off by the chickens shall be lifted from the bottom of the box. The reason assigned by many for this deviation from the original plan is that they fear a draught will affect the chickens. This fear is absolutely groundless in respect of the ventilation holes mentioned. What the chicken-rearer has to fear more than draught is want of ventilation, and at the right point. These brooder units are not only the result of practical experience in working them over a long period, but they are scientifically constructed, and are not likely to be improved upon by departure from the plan.

Installation without Boxes.

In connection with this class of brooding, some operators have done away with the boxes, and have substituted something on the hover principle, partially, it appears, with a view to reducing the labour in cleaning, &c. In this connection it will be interesting to users of these installations to learn that the hover principle is not new, but was one of the stages passed through nearly twenty years ago in the evolution of the present system of box units which has proved so eminently satisfactory when the plant is properly installed.

A miscellaneous publication on the hot water circulating system of heating brooders, which affords further information and full plans for construction, is available free on application to the Department.

Orchard Notes.

August.

W. J. ALLEN and S. A. HOGG.

As the past two seasons have been particularly wet, it is only to be expected that during this season there will be another visitation of various fungi. It is, therefore, essential for the successful fruitgrower to spray his trees as a preventive against diseases. As a general spray, that is to say, for fungus and some insect pests, lime-sulphur has come into general use, being valuable as a preventive of leaf curl of peach, black spot and scab of apples, and black spot of vines. In some cases where peach trees have been attacked by black and green aphis, a spraying in the early spring before the buds burst will prove beneficial. For this purpose, nicotine washes may be recommended. In the case of delicate plants, soap may be used, such as sunlight soap. For such pests as red spider and San José scale, lime-sulphur has proved most effective; but for brown, red, and mussel scale red oil emulsion gives better results. In some districts Bordeaux mixture has proved to be more effective in coping with black spot of apples than has lime-sulphur, but the disadvantage about using Bordeaux mixture when the fruit has formed is that the fruit is often scalded and disfigured. In districts where this occurs, Bordeaux may be used as a winter spray, followed up by lime-sulphur in the spring and summer.

Treatment of Vines.

After pruning, the vines should be dressed with a solution of sulphate of iron and sulphuric acid, or with a solution of sulphuric acid alone, as a control for black spot. As the seasons have been wet, it is only to be expected that this disease will be prevalent if steps are not taken to keep it in check. As a preventive of oidium, sulphur should be used. It has been found that the best check to this disease is the fumes of the sulphur—not the direct contact of the sulphur dust. It is advisable to place a small quantity of sulphur dust within the crown of each vine, so that during the warm days the sulphur volatilises and destroys fungus spores that may be floating in the air before they come into contact with the host, which is the young, succulent growth of the vines.

Cultivation.

In cases where ploughing has been delayed, it should be immediately completed, and the orchard from now on kept free from weeds by the medium of the cultivator. In the case of young trees which have been planted this year as re-fills, particular care should be taken to keep the soil thoroughly loosened round them so as to conserve all available moisture. It is often found that re-fills will remain stunted. This being so, an application of well-rotted farmyard manure is recommended. In the first instance, this should be forked into the soil around the young trees, and on top of this a mulch of manure may also be placed. The depth of the mulch should be at

least 3 inches, though deeper would, of course, be more beneficial and lasting. This only refers to re-fills, not to young trees planted in virgin soils. With regard to the ploughing of orchards and vineyards, it is recommended that this work (particularly in the drier districts) should be completed as early as possible after pruning, so as to retain the winter rains.

Green Manuring.

Where one has the control of a water supply, green manuring may be recommended; but where one is depending on the rainfall, it is rather risky, and, generally speaking, under these conditions it cannot be recommended. On the other hand, if a crop of peas or any of the legumes can be grown and ploughed in without robbing the orchard of its requisite amount of moisture, they will prove very beneficial, particularly in heavy soils that require humus and loosening, and in sandy soils that require binding as well as humus. Of course, such crops should have been ready to be ploughed in not later than the beginning of this month.

Artificial Fertilisers and Farmyard Manure.

With the exception of the citrus family, artificial fertilisers have not proved particularly beneficial. On the other hand, such fruits as peaches, plums, apricots, apples, and pears respond readily to the application of decomposed vegetable matter or farmyard manure. Where sheep manure is obtainable it may be used with great advantage as a stimulant to oranges and lemons. As in most cases it is almost impossible to obtain a sufficient quantity of farmyard manure, its use may be confined to the weakened and stunted trees, which may be restored to vigour in that way.

Planting of Young Trees.

It is getting late now for planting, but in the late districts if this work has been prevented by wet weather or other causes, it should be taken in hand without delay. Young trees, as they are removed from the nursery, require pruning before planting. The roots should be shortened to, say, 3 inches from the main upright, and all broken roots removed. In planting, special care should be taken to see that the trees are not planted too deep, and in filling the hole care should be taken not to bruise the roots. The ground should be firmly trampled so as to drive out the air, and the tree should have a firm anchorage. The tops should next be removed to a height of about 15 inches to the ground. In order to ensure the formation of a good even crown, it is found better to remove any laterals, so that dormant buds may receive an equal amount of the rising sap.

Grafting.

The operation may be performed as the sap is rising, which generally takes place about the end of this month. Where it is desired to work over old trees, the scions should have been retarded in their growth after removal either by burial or cold storage. In some cases the variety which it is intended to graft in may be later in starting than the stock which is to be worked. In such cases the grafting wood may be left on the parent tree and cut and used for the grafts as required.

Agricultural Bureau of New South Wales.

REPORTS AND NOTICES FROM BRANCHES.

NOTE.—While gladly publishing in these columns the views of members of the various Branches of the Agricultural Bureau, the Department does not necessarily endorse the opinions expressed.

Adamstown.

This branch met on 30th June, when Mr. P. Vaisey delivered a lecture on the care and treatment of the horse. It was decided to hold a social for members of both ladies' and gentlemen's branches in the spring months.

Ben Lomond.

A branch has been formed at this centre with the following office bearers :—Chairman, Mr. C. D. Judge; Vice-chairmen, Messrs. D. J. Cregan, P. M. Egan and M. McDonagh; Hon. Secretary and Treasurer, Mr. H. W. Weller.

The branch has begun with a membership of over forty.

At a meeting on 2nd July, Mr. M. Reynolds, Inspector of Agriculture, was present and delivered an address on the objects of the Bureau.

It was decided to conduct competitive potato trials of selected seed from various growers, and to give prizes or certificates to the owner of the varieties most worthy for trueness to type, freedom from disease, and yielding capacity, each competitor to supply 56 lb. seed free, the right to reject the seed being reserved. It was decided to conduct the competition through the Potato Growers' Association, arrangements being made with one or more growers to provide the land and carry out the necessary work of planting, cultivating, and harvesting, each plot not to exceed about 1 acre. The potatoes so grown to be at the option of the association for purchase for three months after maturity, the price to be £3 above the average market price at the time.

It was further agreed to appoint three potato growers to attend a conference on the subject of potato growers' interests in order to arrange for joint action in (*a*) the fixing of standard types of each variety; (*b*) granting seed certificates to any grower for any area of potatoes; (*c*) a special potato show (including subsidiary crops, such as maize, peas, &c.) to be held in 1922; (*d*) joint action in other matters of interest to potato growers.

The meeting also expressed the opinion that steps should be taken to formulate a scheme whereby growers' requirements could be procured for them and their produce disposed of on their behalf.

Bimbaya.

At a meeting on 18th June, arrangements were made for the "Carruthers Boys' and Girls' Maize-growing Competition," to which Sir Joseph Carruthers had contributed £2 2s. for the prize fund, and a number of other persons smaller amounts, as well as several special prizes for the girls' jams, jellies and preserves competition.

A discussion took place on the subject of keeping pigs for profit.

Mr. E. H. FILMER favoured crossing the half-bred Tamworth sow with a pure-bred Berkshire boar for bacon pigs. The Berkshire was a good pig but was inclined to fatten while too young, and many of them had to be sold as porkers. The Middle Yorks were very soft and inclined to scald, and were unsuitable as bacon pigs; by crossing with other breeds they might give good results. The Tamworth was a very hardy pig, and in his opinion the baconers were the most profitable for marketing.

Mr. E. T. BOLLER considered the district very suitable for pig raising, and production could be greatly increased. He found that the Berkshire-Tamworth cross resulted in a pig which was rather slow in fattening. Sows having a slight Tamworth strain, when crossed with a Middle York boar gave good results. Pigs weighing from 120 to 140 lb. were the best for market. Grain and skim milk, fed in the right proportion, gave better results than either fed alone. Breeding sows should be allowed to forage for themselves; it was a mistake to let them get too fat.

Mr. Geo. ALCOCK favoured the Tamworth-Berkshire cross. He had found them weigh 135 lb. at six months old. A half-bred Tamworth sow put back to a Tamworth boar produced a good bacon pig. He found that the Berkshire fattened too quickly and often went in the legs. A pure-bred Tamworth, if given proper food, would fatten in nine months, and make a good bacon pig. The opening of a bacon factory in the district would mean a more regular market, and he thought more pigs would be raised.

Mr. A. JONES said that to be successful, pig-raising should be run in conjunction with dairying. He had some experience with Berkshires and found they gave good results. He had them weigh up to 140 lb. at seven months. He was trying a half-bred Tamworth sow crossed with a Berkshire boar. Maize and skim milk was a good ration for pigs.

Mr. HAFFNER said that he had seen good results from a large black sow crossed with a Berkshire boar. He would like to hear other members' opinions on the large blacks.

Mr. E. T. BOLLER considered the large black had not been a success. Their flesh was inclined to be coarse. The Tamworths were very prepotent, but certainly very slow in maturing. A breed which matured a little earlier was required.

Borenore.

At a meeting on 18th June, arrangements were advanced for lectures at early dates. It was remarked that a demonstration of packing, conducted by Mr. Inspector Broadfoot had been very beneficial, and would be the means of bringing in the use of standard grades in the district.

A pruning demonstration was conducted by Mr. S. A. Hogg, Assistant Fruit Expert, on 22nd June, when valuable advice was given.

A report on the first small consignment of goods purchased by the branch on behalf of members was tabled. Some appreciable savings were effected, and it is anticipated that pool-buying will be extended, and that presently practically all supplies for farmers and orchardists will be procured through the branch.

Castle Hill.

On 13th June, Mr. J. Hadlington, Poultry Expert, visited this branch and delivered a lecture on the rearing of poultry. Great stress was laid on the necessity for keeping the young chicks sufficiently warm to prevent over-crowding in any part of the brooders. Over-crowding caused sweating, with the result that the chicks caught cold.

Chatswood.

On 13th June, Mr. T. McCarthy, Assistant Entomologist, delivered a lecture at this centre on insect pests, keeping a large audience interested for two hours. The principal pests of fruit, vegetables and flowers were described and illustrated by means of a lantern, their life histories sketched, and the methods of control outlined.

Coonabarabran.

The branch at this centre has been re-formed with the following office bearers:—Chairman, Mr. H. H. Moss; Vice-chairmen, Messrs. H. Croxon and H. E. Crane; Treasurer, Mr. H. Inglis; Hon. Secretary, Mr. W. J. Fleming. A programme of meetings has been arranged for the next few months, including a pruning demonstration at an early date.

Cooper's Shoot–Broken Head.

At a meeting on 18th June, a discussion took place on line breeding as a means of improving dairy stock. Several members confessed themselves strongly in favour of the system, quoting some of the leading studs in the State as evidence of its benefits, while others contended that to employ line breeding for any length of time would lead to trouble, as the animals would lose constitution, vigour, &c.

Coradgery.

At the June meeting of this branch, the delegates at the Orange District Conference submitted a report of the discussion and resolutions carried, and remarked that though the attendance at their first conference was not large, the delegates exhibited a great deal of enthusiasm in the movement and were hopeful that next conference would be attended by delegates from many more branches, and that similar conferences would result in considerabl benefit to the Bureau movement.

Mr. P. W. Lorimer read a paper on the past wheat season, from which the following is taken:—

The Harvest of 1920–21.

Owing to the abnormally good wheat-growing season of 1920, any comparison of the merits of the various early and late wheats was unsatisfactory as a record. There being no autumn rains the whole of the crop germinated at the same time—about the middle of June—and with good winter and spring rains all the early wheat made excellent growth and looked like beating the later ripening varieties; but the early summer rains, which in so many cases bleached the early varieties, made very good crops of the late ripeners. The heavy rain and wind of early December tested the standing ability of the straws severely, but in this district it was the midseason wheats which were most affected, as practically all the early varieties were stripped and in many cases the late wheats, such as Yandilla King and Rymer were not thoroughly ripe, and consequently were better able to stand the weather. This was evidenced from the fact that Yandilla King stripped on Adavale was scarcely bleached at all.

Of the midseason wheats, Federation and Hard Federation stood out as the best resisters of the weather, though even Federation, owing to its abnormal growth of straw, lodged badly in places.

Of the early wheats, Canberra yielded 33 bushels per acre and cut up to 3 tons per acre of hay. Improved Steinwedel yielded 31 bushels per acre. Both these were stripped before the rain, and the bushel weights were 66 and 64 lbs respectively. Viking, a midseason variety tried here for the second season, was a beautiful crop until the rain, but lodged very badly. College Purple also lodged badly and showed signs of shelling.

Of the late varieties, Yandilla King stood the weather slightly better than Rymer and was less bleached.

Canberra proved itself to be the best dual purpose wheat of the season, ripening early enough to allow the hay carting to get finished before stripping commenced, at the same time yielding heavy cuts and making excellent chaff.

The whole of the crop on Adavale, just on to 1,100 acres, actually stripped an average of 25 bushels per acre. The loss from the rain can only be estimated, and from a comparison of the crops with that portion stripped before the rain and the returns actually harvested I would estimate it (including loss of weight per bushel) at up to two bags per acre.

The one outstanding feature of the season was the success of the reaper thresher or header in lodged crops, and it was owing to these that the wonderful yields throughout the whole State, in spite of the awful damage by wind and rain, were achieved. Had the same damage occurred ten years ago, I venture to say that not more than 40 to 50 per cent. of the crop would have been secured for market.

Cordeaux-Goondarin.

A turnip-growing competition was conducted by this branch during the past season, and occasioned considerable interest. Mr. R. N. Makin, Inspector of Agriculture, was detailed by the Department to judge the competition, and his report and awards were as follows :—

TURNIP-GROWING COMPETITION.

There were four sections to be judged, viz., (1) the heaviest yield per acre, (2) the heaviest weight per dozen turnips, (3) the dozen turnips most suitable for market grown from Carter's seeds, and (4) the best dozen grown from Yates' seeds.

There were four competitors, to whom points were awarded, in the first section of the competition as follows :—

	Possible Points.	F. March.	E. Walker.	R. J. Fishlock.	E. Reece.
Trueness to type	10	9	8	7	9
Evenness of growth	5	4	3	3	3
Freedom from disease ...	5	4	5	5	4
Cultivation	15	10	15	15	10
Market value	15	10	10	12	9
Yield 30-ton standard ...	50	42	30	24	19
	100	79	71	66	54

The actual yields per acre were :—F. March, 25 tons 6 cwt.; E. Walker, 18 tons 5 cwt.; R. J. Fishlock, 14 tons 5 cwt.; E. Reece, 11 tons 7 cwt.

In the second section the awards were as follows :—E. Walker, 110 lb. per doz., first; F. March, 60 lb., second; R. J. Fishlock, 50 lb., third.

In the third section they were :—R. J. Fishlock, 88 points, first; F. March, 74 points, second.

In the fourth section :—E. Walker, 86 points, first; F. March, 76 points, second; E. Reece, 71 points, third.

In several cases the crops would have scored better if they had been judged earlier, and if Mr. Fishlock's had been thinned more his results would have been better. The turnips seen on Mr. Walker's farm were very fine, but he had not intended to enter the first section, and some roots had been gathered prior to judging. The roots on Mr. March's plot were much more uniform than on the others, and showed better thinning. There is no doubt that turnips of the very best quality can be produced in the locality, and with more attention to thinning and cultivation much better yields could be obtained. The branch is to be commended on the interest in the subject that has been created.

Cunningar.

A pruning demonstration was given by Mr. S. A. Hogg, Assistant Fruit Expert, on 13th June. Visiting first Mr. Ough's orchard, the results of last year's pruning demonstration there were noted, and then, going to Mr. Stock's orchard, a further examination was made of grapes, oranges, lemons and various young trees which were dealt with according to different methods. The results will be watched with close interest.

Dapto.

At this branch, on 9th June, a discussion took place on the breeding and diseases of dairy cattle.

Mr. J. J. COOK, who led the discussion, remarked that only cattle of strong constitution should be selected. Many leading show cattle were line-bred, as their pedigrees showed; this was done by the selection of the best male calf of a sire in successive years, and mating him with distant relatives, but an inbred bull of weak constitution was dangerous. The bull should be pure-bred, selected from heavy producers. It was a mistake to dispose of an old bull if his heifers were good; it was better to keep him and

mate him with old cows, and then if the younger bull's heifers were failures, there would be animals in the herd on whom the farmer could fall back. Heifers from sound healthy cows should be selected.

The subject was discussed by all present, some criticising Mr. Cook's remarks in a helpful way.

Dural.

The annual meeting was held on 5th July, when the following office bearers were elected.—Chairman, Mr. E. L. Archer; Vice-chairmen, Mr. C. T. Hunter and Major Parker; Treasurer, Mr. B. F. Renant; Auditor, Mr. J. W. Thacker; Hon. Secretary, Mr. C. J. Brossois. The secretary expresses confidence that the branch will shortly become more active.

Freeman's Reach.

A meeting of this branch was held on 21st June, when general business was transacted.

Glenfield.

At a meeting of this branch on 17th May, a paper was read by Mr. W. Magee, on wool-classing.

Wool and Wool-classing.

Wool is a modified hair, but differs from an ordinary hair in not being straight, having small waves, which are called crimps. The scales which form the covering of the fibre do not fit smoothly, but the upper edge of each scale projects, producing what is termed a serration. The waves can be seen with the naked eye—in fine merinos as many as thirty to inch. The serration can only be seen with the aid of a microscope, and as many as 3,000 may occur along a length of one inch of fibre; so that wool fibre is just a mass of small cells. Those in the centre are the largest, and as the cells push up or grow from the centre they are pushed out and flatten, overlapping like the scales of a fish, and forming the serrations mentioned.

The crimps give elasticity and softness, while the serrations are a powerful agency in the production of the felting power of wool, and it is due to these properties that it is of such commercial value, as the formation of the fibre enables it to take the very finest of dyes.

The cells in the cross section of the wool fibres, according to experts, are 1,500 in number, and taking the average length to be one four-hundredth part of an inch, there are no less than 600,000 in every inch of single fibre. In strong wools these cells are not so numerous, showing as low as 900 at the cross section.

Ordinary hair differs from wool in that it has a smooth surface and has elongated cells, which contain marrow and will not stretch, but break, but wool will stretch. Looking at wool fibre under a microscope, it resembles a tree, the serrations all overalpping as the bark on a tree.

Wool-classing is quite different from wool-sorting, as in classing the whole fleece is classed, while in sorting the fleece is sorted according to the qualities in the fleece. Classing is the placing of the fleeces in different grades according to the length, quality, soundness, condition and colour. It is bad practice to overclass a clip—that is, to make unnecessary sorts.

The classer is absolutely responsible for the get-up of all the wool apart from the fleece, and before shearing starts he must get the shed hands to have everything in position to take the wool, as a man that knows his work will not have any stoppage through the congestion of wool, and if 3,000 sheep have to be gone through every day, everything in the wool-room must be kept moving all the time to keep the wool clear.

The lecturer then proceeded to explain the operations at different sheds. Numerous photographs of sheds and samples of wool were exhibited, making the lecture very interesting and instructive.

A meeting was held on 21st June, when a paper was read by Mr. P. McDonald on the improvement of social conditions in the country. A eport will be published next month.

Glenorie.

A pruning demonstration was given by Mr. A. T. Hunter on 30th June, the attendance being very satisfactory, notwithstanding a deluge of rain just before. Mr. Hunter's methods were closely followed, and the stream of questions and answers was kept up until dark. The trees treated will be closely watched in this and next season.

A meeting was held on 2nd July, when the pruning demonstration given by Mr. Hunter was discussed with keen interest.

This branch has been allotted space by the Sydney (Metropolitan) branch for an exhibit of fruits early in August. Growers are confident of a good display, both in variety and quality of fruit. The changes in connection with the Great Northern Road were again discussed, as were the prospects of municipal markets in Parramatta. Arrangements were advanced for a show on 10th September.

Some discussion took place on the question whether artificial manures already worked into the soil would be leached away by the recent deluge of rain. The opinion was held by most that though certainly a good deal of the fertilising elements might be leached away, it was better to work the manures in during winter than later on.

Inverell.

The monthly meeting was held on 17th June, Mr. J. Ditzell presiding. Correspondence from the Department gave the names of certain weeds, of which specimens had been sent a month earlier.

The secretary reports a visit by Mr. H. Chapman, Dairy Instructor, on 25th May, when a lecture and demonstration on the points of a cow was given, the result of which was a good deal of interest in the subject of herd-testing, and the likelihood of the formation of a testing association. In a discussion that followed Mr. Sweaney in particular advocated the formation of such an association, pointing out that while in other dairying countries the average production per cow was 250 lb. to 300 lb., in Australia it was only 150 lb. The difference was absolutely due to herd-testing in the progressive countries.

Kangaroo Valley.

On 9th June, Mr. C. C. Crane, Organising Inspector, attended and gave a lecture on co-operation. Mr. Crane indicated the steps that were being taken by other branches, mentioning that between thirty and forty centres had already formed co-operative circles, by which pool-buying of farm requirements could be worked to advantage, large savings being effected owing to the low cost of upkeep.

At a meeting on 20th June, useful discussions took place on a variety of subjects, especially on (1) the effect of colour on the value of a cow; (2) the testing out of poor producing cows; (3) whether it is profitable to hand-feed cows in winter, having regard to the high prices of feeds (it being considered unprofitable at the immediate time, but beneficial in bringing the cows into full profit in the summer); (4) the prevention of diseases among calves; (5) the ill effects that may follow branding; (6) co-operation with Cordeaux-Goondarin branch in an effort to secure an Inspector of Agriculture for the Illawarra and Southern Tablelands to Goulburn.

Kellyville.

On 4th June, Mr. H. Reid gave a lecture on lime-sulphur, describing his method of mixing it for himself. He had had quite satisfactory results in the control of scale and had found it an inexpensive application.

Lower Portland.

The branch met on 9th June, when the secretary's report on the exhibit at the show was considered. The fact that the branch had again gained first prize for a Bureau exhibit, being the third time in succession, was regarded as highly satisfactory.

The local show was a great success, financially and otherwise. The entry was a record one, and there was competition in almost every class. The prize money totalled £42 as against £23 last year.

The branch is now arranging for the annual effort in aid of the District Hospital funds.

March.

A paper by Mr. N. Griffith was read at a meeting on 18th May. A report will be published next month.

On 21st June, Mr. S. A. Hogg, Assistant Fruit Expert, gave a pruning demonstration at Mr. A. V. Howarth's orchard.

Middle Dural.

A meeting for the election of office-bearers was held on 23rd June, when the following were chosen :—Chairman, Mr. R. Roughley; Vice-chairman, Mr. A. C. Hunt; Auditors, Messrs. J. T. Eagle and G. O'Connor; Hon. Secretary and Treasurer, Mr. A. E. Best (*pro tem.*)

A motion was passed asking that the Government should compel manure manufacturers to guarantee the analysis of their product, and that each sack be accompanied by the weight and analysis. Action was also taken relative to section 509 of the Local Government Act, 1919, with reference to a resident medical practitioner.

Milton.

Parallel with the decision of 14th June to purchase two bulls for the use of farmers in the district (mentioned last month), this branch is considering the formation of a herd-testing association, a notice of motion having been lodged to that end.

A pruning demonstration was given by Mr. G. A. Jones on 26th May in Mr. R. Davis' orchard. Many questions were asked during the work on the trees, and much useful information was given. A demonstration of budding and grafting was also given.

Mount Keira.

Mr. G. Jones gave a pruning demonstration at Mr. C. Yates' orchard in connection with this branch on 25th June, when those present were treated to a very interesting and practical lesson on dealing with different fruit trees with a view to maximum production.

Oberon.

At a meeting on 16th June, Mr. G. W. Kelly read a paper on potato-growing, of which a summary follows :—

Potato Growing.

Last year he had carried out tests for the Department with four varieties, each receiving 2½ cwt. superphosphate per acre. The land was not new ground, but had

been cultivated almost continually for the past twenty-five years, and was not o superior quality. In the Up-to-date plot, fully half of the seed never struck. The seed had been obtained from another district, but there was nothing better than the local seed for good results. Of Carman No. 1 quite one-third of the seed missed.

The results were as follows :—Factor, 7 tons 10 cwt. 1 qr. 19 lb. per acre; Manhattan, 7 tons 12 cwt. 1 qr.; Up-to-date, 4 tons 18 cwt. 0 qr. 2 lb.; Carman No. 1, 4 tons 12 cwt.

In future the growers around Oberon should go in more for the big yielding, table varieties. Many coastal farmers, owing to the high price of seed and losses from blight, were finding that potato growing was not sufficiently profitable, and this should be the opportunity for the Oberon farmers.

Manurial Trial with Early Rose.—Local seed was used and planted on 22nd December. Large seed had been cut, and about one-half missed. Some struck and came up, but withered away. The results were :—P9 (10 parts superphosphate, 3 parts chloride of potash, and 3 parts sulphate of ammonia) at the rate of 4 cwt. per acre, 4 tons 9 cwt. per acre; superphosphate, at 2½ cwt. per acre, 4 tons 8 cwt.; superphosphate at 5 cwt. per acre, 4 tons 3 cwt.; M7 (10 parts superphosphate, and 3 parts chloride of potash) at 3½ cwt. per acre, 3 tons 17 cwt. 2 qr. 10 lb.; P7 (equal parts superphosphate and bone-dust) at 2½ cwt. per acre, 3 tons 11 cwt. 12 lb.; no manure, 2 tons 14 cwt. 2 qr. 12 lb. The most profitable treatment was with 2½ cwt. per acre superphosphate, which (with potatoes at £6 per ton and superphosphate at £6 15s. per ton) gave a profit compared with no manure of £9 3s. 2d. per acre. He had come to the conclusion, after three years' trials, that superphosphate alone could hold its own for economy with the best of manures.

A trial with nitrate of soda had also been conducted last year, and in combination with superphosphate and basic superphosphate, had shown a profit of £2 5s. 6d. per acre.

He had grown potatoes for six years in succession on the same land, and had averaged 4½ tons per acre. His highest yield had been 9½ tons per acre on new land. He favoured whole seed, for cut potatoes often missed.

Every grower should select his own seed by choosing two good tops in every drill, keeping the potatoes from these plants separate, and selecting the best for seed. He found Blue Manhattan was the best keeper; he had kept them till February. Scab was found more on potatoes grown where fires had been or where there were ashes. He thought potatoes grown on red soil were the better eating. Rank growth seemed more liable to blight.

A discussion took place on the possibility of the establishment of a dairy factory locally, Mr. Franklin (Chairman) believing it to be possible to get one erected if sufficient cows offered. A committee was appointed to collect information regarding the number of promises of support and to report at the next meeting. About 160 cows were promised in the room.

A potato competition (Satisfaction variety) was won by Mr. G. A. Batchelor, with Mr. G. N. Falls second. Another competition for Manhattans and any white-skinned variety is also projected.

A special refreshment fund has been started by this branch.

Pambula.

Mr. S. A. Hogg, Assistant Fruit Expert, gave a pruning demonstration on 29th June, when much interest was shown in the different methods of pruning, especially of peaches. Those present indicated that they would closely watch the behaviour of these trees next season. A demonstration of grafting and bud-grafting was also given.

Penrose-Kareela.

The monthly meeting was held on 13th June at Mr. C. P. James' residence, when useful discussion took place on a number of subjects.

Rydal.

At a meeting on 20th June a paper was read by Mr. A. Lemon, of which a report will appear later.

Springside.

The following is a summary of a lecture delivered before this branch by Mr. W. R. Birks, Inspector of Agriculture, on 24th May :—

Green Manuring, and Rotation of Crops.

The presence in the soil of nitrogen is absolutely essential to the growth of plants. The most economic source of nitrogen is leguminous crops, like trefoils, vetches, peas, &c., which should be grown every second or third year. At present it does not pay to use the nitrogen in the various artificial nitrogenous manures.

Humus is also absolutely necessary, and its supply in the soil must be maintained. The presence of humus increases the moisture-carrying capacity of the soil, tends to keep the soil from setting, and provides food for the soil bacteria. It results from the rotting of vegetable matter. On a rough average, the quantity of humus in new ground is about 20 tons per acre, and the rate of loss per annum is approximately 1 ton per acre. The humus resulting from the decomposing roots and stubble of a wheat crop amounts to about half a ton per acre.

The system of replenishing the humus supply by adding farmyard manure is practicable in England, because in many parts they stable their stock all the year round. In Scotland cattle are brought over from Ireland, and never leave the stables for months at a time. Tons of straw are used daily for bedding, and a large quantity of turnips for feed. These all decompose and remain on the floor, often to a depth of about 4 feet, until the whole is carted out on to the paddocks.

Here in Australia, however, farmyard manure is almost a negligible quantity, and is not sufficient to supply the gradually diminishing quantity of humus in the soil, so we must adopt other methods.

It hardly pays to grow a green crop and merely plough it under in order to increase the supply of humus in the soil. It is more profitable to graze off the greenstuff and plough under the droppings from the sheep. The loss of humus-producing material in feeding off greenstuff is only about 5 per cent., as the following example will show :—Every ton of hay is equivalent to about 3 tons of greenstuff. So a good crop of greenstuff can be put down at about 6 tons per acre. If we graze this off by periodically running twenty sheep on it, we shall find that sheep going in at 80 lb. will come off at about 110 lb. That is to say, each one has absorbed 30 lb. material, and the twenty have absorbed 600 lb., or about a quarter of a ton. From the crop of 6 tons of greenstuff, the sheep have removed only about 5 per cent. in total weight, and yet in normal times they will show a substantial profit as fat sheep. Practically the whole of the balance of the crop is discarded by the sheep, and lies on the ground in the form of manure. The proportion of phosphates lost is about 10 to 20 per cent., nitrogen about 5 to 10 per cent., and potash about 2 per cent.

One of the few occasions when we should be justified in ploughing under greenstuff is in orcharding, as the stock might damage the trees. Peas, or similar crops, could be grown in the early autumn, and ploughed under in, say, June or July.

On an average, a sheep produces one-third to one-half ton of manure per annum, while a horse produces 2 to 3 tons. So that one horse or three or four sheep per acre will produce enough manure to maintain the humus supply where land can be grazed every second or third year.

In brief, the main objects of rotation are to get rid of weeds and diseases, and to replenish and balance the plant-food in the soil. Certain weeds are peculiar to certain crops, and eventually render the crops useless. For instance, black oats mature earlier than wheat, and therefore increase tremendously every year if not controlled by a system of rotation or fallow. The standard of the agriculture of a country may be judged by the length and complexity of the rotation practised. Thus, Denmark is one of the most progressive farming countries in the world. Practically all the farms there—even the small ones of 10 acres—are divided into eight or nine fields, and some such rotation as the following is adopted:—(1) Rye; (2) sugar-beet; (3) oats; (4) mangolds; (5) barley; (6) oats; (7) and (8) clover and grasses; (9) turnips, horse-beans, &c.

The Scottish are among the best of English-speaking farmers, and they adopt the following rotation :—(1) Turnips, to clean the ground and provide feed for cattle; (2) oats, which is a revenue-producing crop, but which dirties the ground; (3) potatoes, which is also a revenue-producing crop, but which cleans the ground; (4) barley, which is a revenue producer, and which mothers the clover and grasses; (5) and (6) clovers and grasses, which supply fodder and renovate the land.

A standard English rotation is: (1) wheat; (2) potatoes; (3) oats; (4) fodder crop.

In the Wimmera wheat district in Victoria, the system is: (1) bare fallow; (2) wheat; (3) grazing.

On Mr. W. Burns's farm in the Carcoar district, the Agricultural Department is experimenting with a two-year rotation consisting of (1) cereals, (2) fodder crop, and (3) potatoes. The cereal occupies the ground from May to December; the fodder crop from February to August; and the potatoes from October to April. The average value of the yields per acre per annum have been:—1914–15, £8; 1916–17, £8 15s.; 1918–19, £9; 1920–21, £10 15s., with the cereal crop yet to come. The land on which these experiment plots are situated is considered only second-rate for the district, but after seven years of the rotation increasing gross returns have been obtained and the ground, if anything, has been improved in condition and is remarkably free from weeds and disease. Although it might not be possible to work all the land in the district on those lines, still some system of change of crop should be adopted for every paddock. In arranging such a system, the following principles should be used as a guide:—

1.—Summer crops that have been intercultivated (*e.g.*, potatoes, maize, &c.) should be followed by a cereal immediately after the former has been harvested.

2.—These summer crops require deep ploughing, whereas the cereals can do with shallow cultivation, provided the land has been deeply ploughed within twelve months.

3.—Oats should be put on land where the previous cereal crop was wheat, and *vice versa*.

4.—Every paddock should carry a leguminous crop, at least (on the average) every three years.

5.—No ground should carry the same crop, or class of crop, two years in succession.

6.—All stubbles should be grazed off, preferably with sheep or pigs, and every second or third year a special forage crop should be raised, which should be entirely grazed in the paddock.

It will be seen that the system involves keeping a larger number of live stock than is general in the district, which is a desirable and inevitable reform if agriculture is to prosper. In no other way can land be continually cropped, and yet be maintained in such a condition of fertility and tilth as to be capable of yielding increasingly heavy returns.

Stratford.

The subject of the dairying industry and of the value of herd testing was discussed on 18th June, when a recent article on the subject by Sir Joseph Carruthers proved a useful starting point.

Sydney (Metropolitan).

A meeting was held on 23rd June, when papers were read by Mr. E. Breakwell on the examination and testing of imported seeds, and by Mr. E. Cheel on the cultivation of pulse.

Testing Imported Seeds.

In the course of his paper Mr. Breakwell stated the method of procedure under the Commonwealth quarantine regulations. A sample of the imported seed was taken from the bulk consignment on the wharf and examined at the seed-testing laboratory at the Botanic Gardens. All the weed seeds were picked out from a definite weight of imported seed. These seeds were identified by means of a standard collection of weed seeds common to different parts of the world. If it was found that such weed seed were likely to be a serious menace to the State, or even that the percentage of seeds of weeds already established here exceeded a certain standard, the parcel of seed was condemned until such impurities could be removed. As an example of the manner in which noxious weed seeds could enter this State, if restrictive action were not exercised, the following weed seeds were picked out and identified in a sample of seed labelled "mixed grass seed," which entered this State just recently:—Sorrel, 32,960; dock, 3,136; wire weed, 288; fat hen, 96; self-heal, 160; scirpus, 240; spurry, 16; Canadian thistle, 16; slender thistle, 16; field cress, 16; hawkweed, 16; ergot, 3,200.

Such legislation protected the farmer, but a serious drawback was the fact that only imported seed was examined. All State or interstate seed was not examined, and it was obvious that State pure seed legislation was necessary to enforce this.

Pulse Culture.

In the course of his remarks, Mr. Cheel stated that in California there were fifteen varieties of beans cultivated as staple crops. In 1917, 558,000 acres of land were under bean crops, which yielded eight million bushels of dry beans, constituting 44 per cent. of the entire crop of the United States.

French or Kidney Beans were great favourites with all Europeans as a green vegetable, and in some parts of France large crops of the white-seeded forms were grown for the dry seeds, which were called French haricot beans, and were superior in flavour to those sold by Sydney grocers as haricots. Under favourable circumstances the best varieties of French beans would yield up to 200 bushels of pods per acre; these were excellent as green vegetables.

Lima beans, Mung bean (known under several names, including Jerusalem pea), and Adsuki bean (also known as Jerusalem pea) were also referred to.

As a green manure plant there was nothing better than Rice bean, especially for the warmer parts of the State. The vine was not so coarse as that of the Velvet bean, hence it was more easily dug in than the latter. It was an excellent crop for weed suppression, and had proved successful as a cover crop in banana plantations.

Chickling vetch, or so-called Indian peas, was cultivated in some parts of Europe as a food crop for cattle, and occasionally it could be seen under cultivation in this State, but on account of the harmful effects of the seeds on human beings and even cattle when used as food, it was inadvisable to encourage its cultivation.

On 1st July, Mr. L. T. McInnes, Dairy Expert, gave some information on milk and its products, and several speakers contributed opinions on different aspects of this subject.

Many farmers were receiving very poor returns for their labour and outlay, and were also deprived of many of the advantages possessed by city workers. The outstanding cause of failure was the poor quality of the dairy stock and consequent low milk yield, the remedy for which was herd-testing with a view to the increase of the production of milk and butter-fat, and the importation of pedigree stock. A series of slides was screened picturing prize cattle from local herds, with tables showing their milk record.

Mr. W. A. Champney, of the Soldiers' Settlement Branch, illustrated the old type of slab hut, without comfort or adornment, and compared it with the pretty modern cottages, replete with every convenience, that have been erected on the Kameruka estate. Methods of cheesemaking were also referred to, including cheddar cheese.

Mr. S. Borcholdt gave an account of the condensed and preserved milk industry, screening a series of cinema films to illustrate the story.

Sir Joseph Carruthers, in opening the discussion, remarked on the high food value of milk and its products, and quoted from recent authorities on the subject of those elusive but necessary bodies known as vitamines, in which milk and butter were extremely rich. Subject to the keeping of a better class of stock and improved methods of management, this industry could be made sufficiently remunerative to pay good wages.

Profes or Watt also took an optimistic view of the industry, pointing to the favourable conditions that obtained in Australia as against Canada and Great Britain, where the animals had to be stall-fed for a good part of the year.

Professor Douglas Stewart emphasised the necessity for farmers acquiring a knowledge of the constitution, anatomy, and physiological functions of the animals under their care, and pointed to numerous losses by stockowners, due to ignorance of the various causes,

Tahmoor.

The following is a summary of the paper read by Mr. A. Crane on the 14th May :—

The Marketing of Our Fruit Crop.

If the grower took the distribution of his fruit into his own hands, he would very soon overcome the whole of his difficulties as far as selling was concerned. The means that should be employed were—(1) co-operative selling, (2) decentralisation of supplies, (3) packing the greater part of the fruit into half or quarter bushel cases.

As to the first of these, local or district co-operation would be the best in dealing with fruit. Where a number of growers in any one district were personally acquainted with each other and working under the same local conditions, and where all saw and understood that their welfare lay in a change of marketing methods and were al

determined to make co-operation a success, the feeling of good-fellowship and honourable understanding which was essential to success in co-operation would exist. He opposed the formation of a larger company, because a group of local growers selling their own highly perishable produce would be careful of their own interests, and would have a thorough grip of the details of the business, whereas with a larger company the fruit must necessarily be handled by men whose only obligation would be to dispose of it, perhaps to the advantage of the grower or perhaps not.

Speaking on decentralisation, his idea was for an association of growers to open up a depôt or market in any centre of population on which they might decide, then to thoroughly canvass that district for orders. There was no fear of not being able to sell the fruit, for in spite of a glutted wholesale market, the public had not been able to obtain the fruit they needed. The association could supply them with fresh fruit straight from the orchard at a price much below what they had been used to paying at the shops. This would create an excellent demand, and as trade grew other branches could be opened and the first one used as a central depôt, to which all fruit should be consigned, and the other branches would be fed from it as required. Opportunities for extending trade would constantly be presenting themselves, and the association would only have to see that the opportunities were taken advantage of.

In the retail trade, except in the case of large orders, it would be advisable to discard the use of the bushel case and to offer the fruit to the public in half and quarter bushel cases, as far more fruit could be sold in that way. The smaller cases did not hold too much fruit for a family to use while it was fresh, and while there would be a little more work attached to packing in small cases, the increased trade would amply justify the extra trouble.

Good trade could also be secured in jam fruit, which would furnish an outlet for second and third grade fruit. It was surprising how many people would make their own jam if they could get suitable fruit at a reasonable price. In a district where there was enough fruit grown to justify the outlay, a small factory might be established for canning, drying, and jam-making. This processed fruit could be retailed to the public in the off season, and would be a sure means of revenue, as well as a partial solution of the marketing problem.

On 11th June two papers were read at a meeting, one by Mr. G. Catt on potato-growing, and the other by Mr. G. R. Stewart on poultry.

Mr. Catt advocated that seed should be selected early and stored in a cool place to prevent early shooting. Any young shoots that made their appearance should not be rubbed off, as that tended to weaken the tuber. If the tubers did not shoot early enough, they could be covered with old bags, grass or straw, but he preferred covering them with dry manure (not too heavily) so that the tubers would give strong shoots. In cutting, the pieces should not be made too small, as the shoots had to feed on the piece of tuber until the roots were formed. In very wet ground he would advise not cutting the seed at all, as they were likely to rot, but sets should be picked with as few eyes as possible. He preferred sowing 3 inches deep and with a fair width, so as to allow room for hilling up. Before hilling a light dressing of superphosphate might be sprinkled along between the drills, and then hilling should be done in two operations, the first when the plant is about 5 inches high and the second before flowering.

It was worse to leave the tubers too long in the ground than to dig too early. He advised digging as the vines turned yellow and commenced to drop their leaves, and storing when quite dry in a dry shed on a board or bark floor and without heaping too thick, but allowing as much draught as possible. It was advisable to avoid sowing potatoes twice in the same ground without a rotation of such other crops as peas or beans, cabbages, or something else.

Tennyson–Kurrajong.

Members of this branch met on 6th June, when Mr. W. S. Arnold delivered a lecture, of which a full report will be published next month.

Thyra–Bunaloo.

The pooling system of handling wheat was discussed at a meeting of this branch on 19th June. While the system came in for some criticism, the meeting favoured a compulsory pool controlled by elected representatives of the wheat-growers, providing the financing could be done without Government interference.

Tilba.

A meeting was held on 15th June, when several matters were discussed, including the formation of a herd-testing association, and it was agreed to ask the Department to send an officer to afford advice and assistance in the matter.

Toronto.

This branch on 6th June considered a letter from the Wallsend branch, asking for co-operation with other branches in the district in forming a farmers and fruitgrowers' co-operative society, and the matter was favourably discussed.

Mr. H. Filmer read a paper, of which a report will be published later.

At a meeting on 6th July the question of representation at the conference on the subject of a district co-operative society was further discussed, and delegates were appointed.

The branch also considered the question of poultry foods, and decided to ask the Department for the analysis of a number of common foods, and the amounts necessary to feed, say, 100 fowls.

Warrah Creek.

On 18th June this branch advanced a number of matters of local interest in which it has been moving, including certain road work, erection of a telephone line from Warrah Creek to Willow Tree, site for a local hall, site for a co-operative sheep-dip, proclamation of stinkwort as a noxious weed in the shire, and framing of rules for the branch.

Wellington.

The annual meeting was held on 21st June, when the balance-sheet submitted by Mr. Kimbell, treasurer, showed a deficit of £6 17s., the flower shows having resulted in appreciable losses. The subsidy, £2 17s., had yet to be credited.

The report showed that in addition to the flower shows, several useful meetings and demonstrations had taken place that had been of profit to members.

The election of officers resulted thus :—Chairman, Mr. H. H. A. Flannagan; Vice-chairmen, Messrs. A. V. Brown and D. Wilkins; Treasurer, Mr. C. Kimbell; Hon. Secretary, Mr. A. Hobson; Organisers, Messrs. F. Davidson and D. Wilkins.

Wentworthville.

A short lecture was given by Mr. C. Giddey on the 8th June, his subject being the extermination of ants. The method recommended was to make four or five holes with an iron bar, at an angle in the side of the hill, insert a lump of carbide of calcium in each, fill with water and close up the holes with clay or mud. This had proved a permanent success.

Yarrunga-Avoca.

On 18th June Mr. E. Breakwell visited this branch and gave a lecture on weeds and grasses, which will be reported later. Delegates were appointed to attend a conference to be held at Moss Vale on the subject of an exhibit at the local show.

AGRICULTURAL SOCIETIES' SHOWS.

Secretaries are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

1921.

Society.	Secretary.	Date.
Murrumbidgee P. and A. Association (Wagga)	A. F. D. White	Aug. 23, 24, 25
Forbes P., A., and H. Association	E. A. Austen	,, 23, 24
Parkes P., A., and H. Association	J. Heel	,, 23, 24
Corowa P., A., and H. Society	J. D. Fraser	,, 30, 31
Grenfell P., A., and H. Association	G. Cousins	,, 30, 31
Hills District Fruitgrowers' Association (Galston)	B. F. Renant	Sept. 3
Young P. and A. Association	T. A. Tester	,, 6, 7, 8
Albury P., A., and H. Society	A. G. Young	,, 6, 7, 8
Gunnedah P., A., and H. Association	M. C. Tweedie	,, 6, 7, 8
Tullamore P., A., and H. Society	H. W. Clarke	,, 7
Manildra P. and A. Association	A. Anderson	,, 8
Cowra P., A., and H. Association	E. P. Todhunter	,, 13, 14
Ganmain A. and P. Association	A. R. Lhuede	,, 13, 14
Cootamundra A., P., H., and I. Association	C. H. Inson	,, 14, 15
Northern A. Association (Singleton)	J. T. McMahon	,, 15, 16, 17
Canowindra P., A., and H. Association	John T. Rue	,, 20, 21
Holbrook P., A., and H. Society	J. S. Stewart	,, 20, 21
Temora P., A., H., and I. Association	A. D. Ness	,, 20, 21, 22
Burrowa P., A., and H. Association	W. Burns	,, 22, 23
Henty P. and A. Society	H. Wehrman	,, 27, 28
Junee P., A., and I. Association	T. C. Humphreys	,, 27, 28
Murrumburrah P., A., and I. Association	W. Worner	,, 27, 28
West Wyalong and District P., A., H., and I. Assoc.	T. A. Smith	,, 27, 28, 29
Deniliquin P. and A. Society	P. Fagan	,, 28
Hay P. and A. Association	C. L. Lincombe	Oct. 5, 6
Narrandera P. and A. Association	W. Canton	,, 18, 19
Hillston P. and A. Society	J. E. Peerers	,, 20
Tweed River A. Society	T. M. Kennedy	Nov. 16, 17
Lismore A. and I. Society	H. Pritchard	,, 23, 24

1922.

St. Ives A. and H. Association	A. K. Bowden	Jan. 13, 14
Albion Park A. and H. Association	H. R. Hobart	,, 20, 21
Kiama A. Society	G. A. Somerville	,, 25, 26
Wollongong A., H., and I. Association	W. J. Cochrane	Feb. 2, 3, 4
Inverell P. and A. Association	A. L. Varley	,, 7, 8, 9
Shoalhaven A. and H. Association	H. Rauch	,, 8, 9
Central Cumberland A. and H. Assoc. (Castle Hill)	H. A. Best	,, 10, 11
Southern New England P. and A. Association (Uralla)	H. W. Vincent	,, 14, 15, 16
Nepean District A., H., and I. Society (Penrith)	C. H. Fulton	,, 16, 17, 18
Dapto A. and H. Society	J. T. Geeson	,, 17, 18
Guyra P., A., and H. Association	P. N. Stevenson	,, 21, 22
Moruya A. and P. Society	H. P. Jeffery	,, 22, 23
Newcastle A., H., and I. Association	E. J. Dann	,, 22 to 25
Robertson A. and H. Society	E. S. Martin	,, 24, 25
Tenterfield A. Society	E. W. Whereat	Feb. 28 Mch. 1, 2
Oberon A., P., and H. Association	C. S. Chudleigh	March 2, 3
Berrima District A., H., and I. Society	W. Holt	,, 2, 3, 4
Glen Innes P. and A. Society	Geo. A. Priest	,, 7, 8, 9
Campbelltown A. Society	J. T. Deane	,, 10, 11
Cobargo A., P., and H. Society	T. McKennelly	,, 15, 16
Barraba P., A., and H. Association	C. E. Williams	,, 15, 16, 17
Tamworth P. and A. Association	F. G. Callaghan	,, 21, 22, 23
Hunter River A. and H. Association (Maitland)	E. H. Fountain	,, 22 to 25
Camden A., H., and I Society	C. C. Irving	,, 23, 24, 25

[Subsequent fixtures are noted but held over.]

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Dam—
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R.A.S. RECORDS:—1st Prize 2 year old and Reserv Champion, 1917; 1st Prize 3 year old and Champion, 191 1st and Champion, 1920, M. S. Section; 1st in yield of milk 1st in Lactation Test Prize, and 2nd in Champion Butte Prize.

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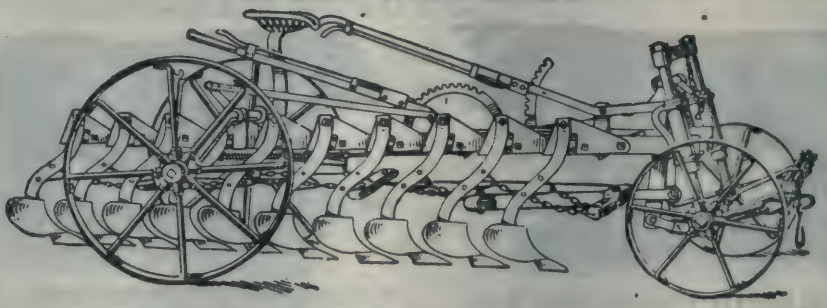

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Dam, Parson's Red Rose II (imp.) (139).

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				1921	
664	Berkshire Boar ...	Callan Park Dan, No. 600a	Callan Park Burra, No. 582	April 16	6 6 0
668	Berkshire Sow ...				
669	Berkshire Sow ...				
671	Berkshire Boar ...	Callan Park Dan, No. 600a	Callan Park Lucy, No. 520d	April 27	6 6 0
676	Berkshire Sow ...				
680	Berkshire Boar ...	Koramburra Major, No. 520a	Callan Park Alice, No. 520e	June 3	6 6 0
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No.	Description.	Sire.	Dam.	Date Farrowed.	Price Each. £ s. d.
				1920.	
2511	Large York. Boar	King Charles II ...	Glad'ville Empress IV	Oct. 1	13 13 0
2527	Large York. Boar	Hawkesbury Ferryman	Gladesville Empress V	Sept. 30	13 13 0
2550	Large York. Sow	Hawkesbury Ferryman	Brighton Lass ...	Nov. 29	12 12 0
2564–65	Large York. Sows	Hawkesbury Ferryman	Brighton Lady ...	Dec. 22	11 11 0
2569	Large York. Boar	King Charles II...	Gladesville Lady..	Dec. 2	12 12 0
2571	Large York. Sow				11 11 0
				1921	
2577	Berkshire Sow ...	Whitley Wales (Imp.)	Goomalibee Patricia	Jan. 10	12 12 0
2578	Mid. York. Boar	Gladesville Sundon	Gladesville Lila ...	Jan. 20	12 12 0
2585	Mid. York. Boar	Gladesville Sundon	White Rose ...	Jan. 20	12 12 0
2587	Mid. York. Sow	Gladesville Sundon	White Rose ...	Jan. 20	11 11 0
2592–93	Berkshire Sows ...	Wodonga Pat ..	Gladesville Queen III	Jan. 21	11 11 0
2601	Berkshire Sow ...	Wodonga Pat ...	Herrison Queen IV	Feb. 6	11 11 0
2604	Berkshire Sow ..	Wodonga Pat ...	Gladesville Duchess III	Feb. 6	11 11 0
2608–9–10	Berkshire Sows ..	Whitley Wales (Imp.)	Herrison Queen III	Feb. 8	12 12 0
2616–17	Mid. York. Boars	Sundon Sydney (Imp.)	Gladesville Snowdrop ..	Mar. 26	12 12 0
2618–19	Mid. York. Sows				11 11 0
2620–21	Large York. Boars	King Charles II...	Gladesville Bourne III	Mar. 12	11 11 0
2622–23	Large York. Sows				10 10 0
2625	Berkshire Boar ...	Whitley Wales (Imp.)	Tarban Jane	April 27	11 11 0
2626	Berkshire Sow ...				10 10 0
2627–28	Berkshire Boars ...	Gladesville Digger	Short Face Jane III	April 27	10 10 0
2629–30	Berkshire Boars ...				10 10 0
2632	Berkshire Sow ...				9 9 0
2633–4–5	Large York. Sows	Hawkesbury Ferryman	Gladesville Empress V	April 22	9 9 0
2636–7–8	Berkshire Sows ...	Wodonga Pat ...	Gladesville Pretty	May 1	9 9 0
2639	Berkshire Boar ...	Gladesville Digger	Gladesville Queen	May 11	10 10 0
2641	Berkshire Sow ...				9 9 0
2646–47	Berkshire Sows ...	Whitley Wales (Imp.)	Thick Haired Jane II..	May 11	10 10 0
2650–51	Berkshire Sows ...	Glad'ville Longfellow II	Polly Pry VI ...	May 21	9 9 0
2652–53–54	Berkshire Sows ...	Gladesville Digger	Polly Pry VIII ..	May 28	9 9 0

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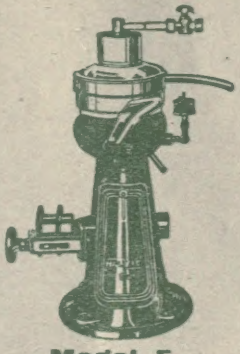

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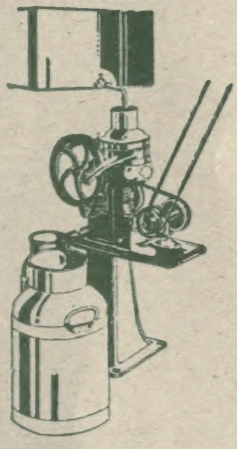

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